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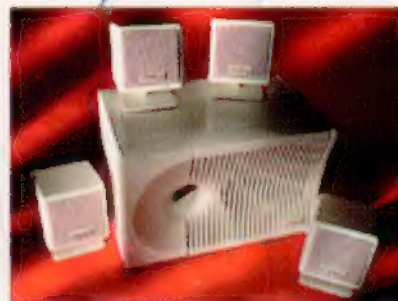
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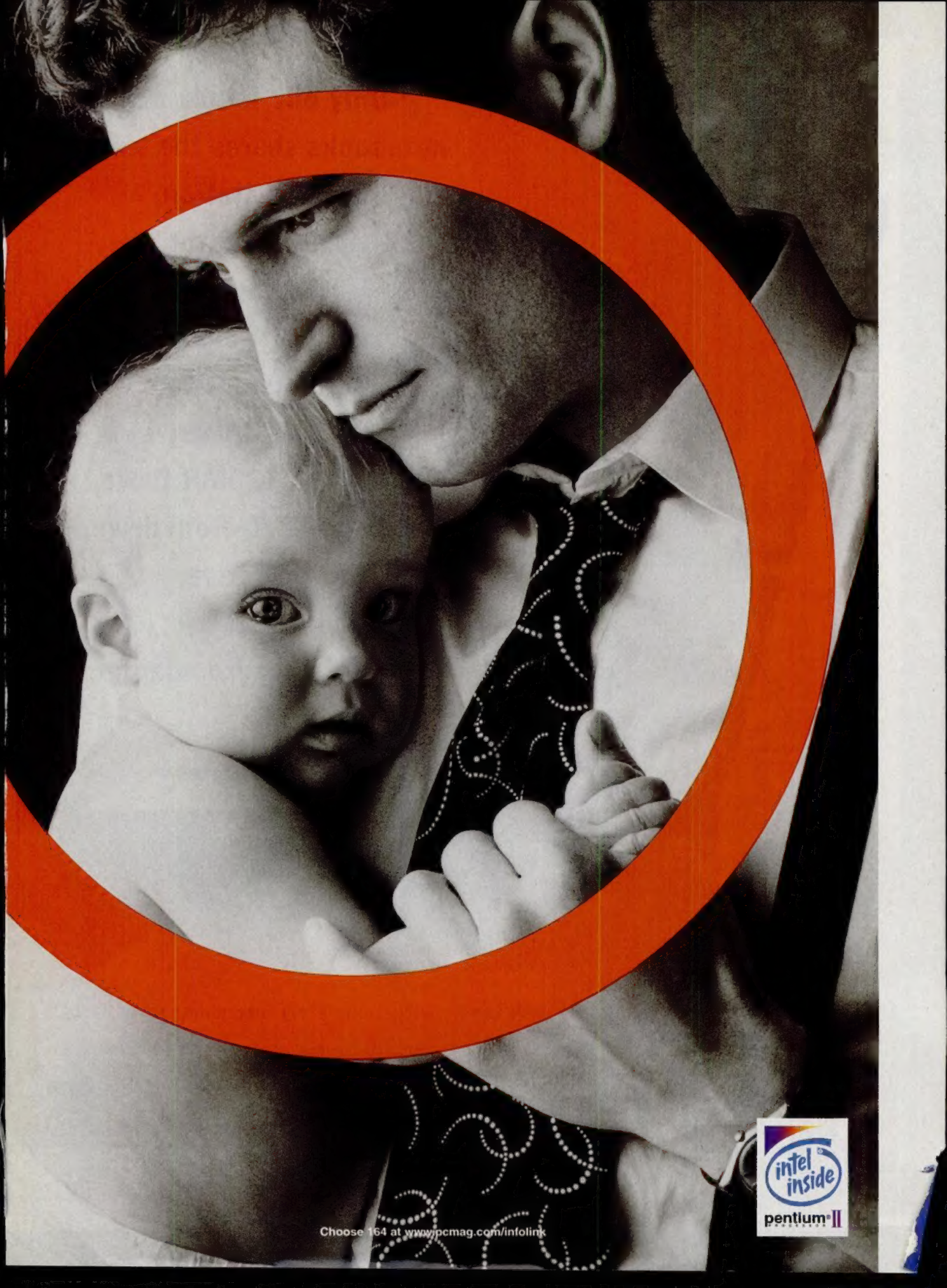
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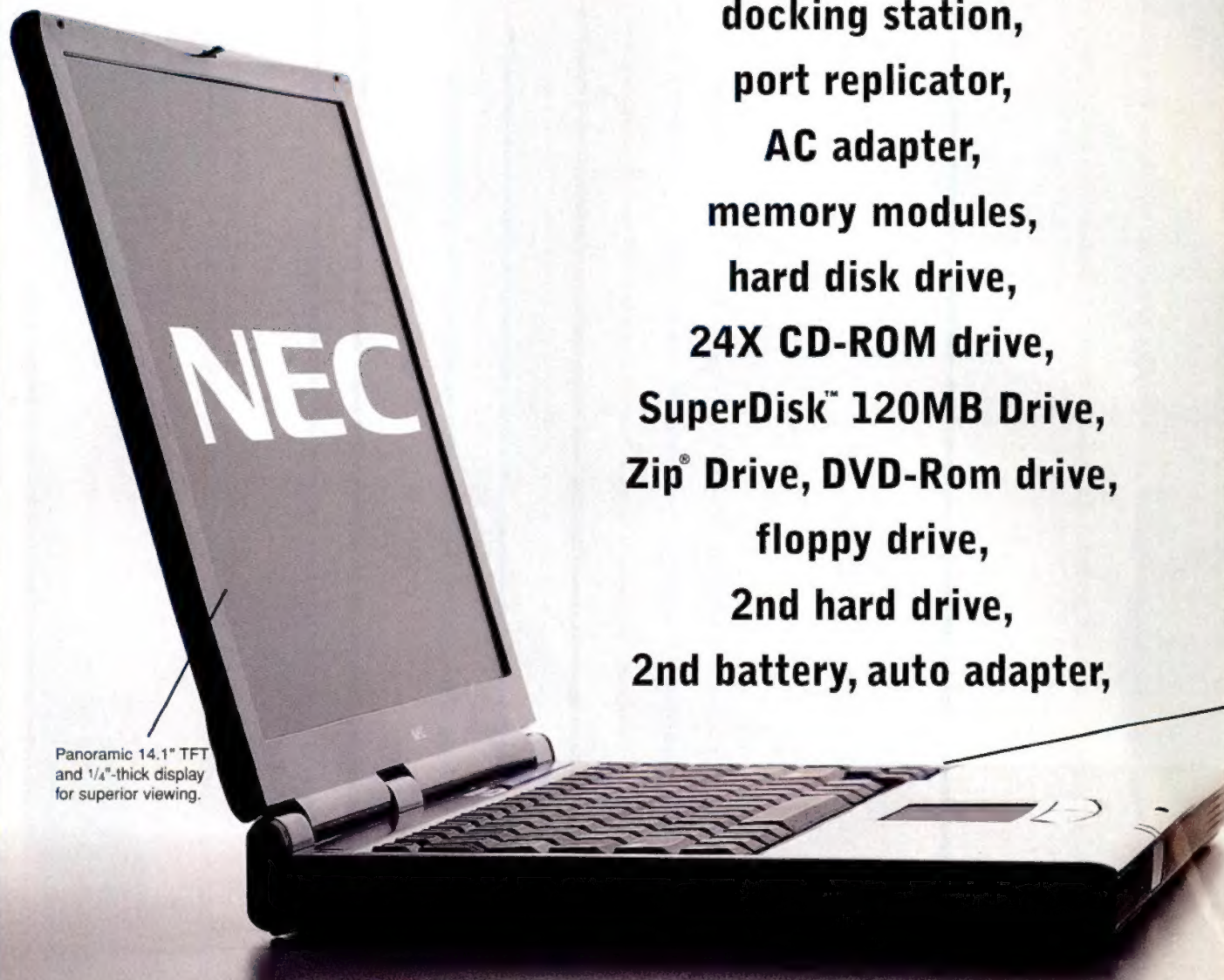




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NT 5.0 and Beyond



Microsoft Windows NT 5.0 is the company's most ambitious operating system yet. On the workstation side, NT 5 promises more stability, better device support, and the ability to run more smoothly on portable computers. On the server side, it promises even more; in particular, a completely revised directory system

should allow network administrators to keep track of all of their users more easily.

But of course, NT 5 isn't ready yet. We'll have to wait until the company has finished to know how well Microsoft has met its goals.

The one thing we know for sure is that NT 5 by itself isn't the end of the road for operating systems. There's a lot more that OSs need to do to make computing more powerful and easier. I know it, you know it, and in recent discussions, Microsoft CEO Bill Gates indicates that he knows it too.

"Simplicity is a jihad" for Microsoft these days, Gates says. He notes the problems that new users have with maintaining connectivity, handling errors, getting help, searching, and upgrading systems.

As Gates explains it, the number of tech-support calls per product is going down, but the average length of a call is going up, because easier problems have been solved. And I was glad to hear him talk about the problems of moving to a new PC from an old one.

From Gates's perspective, simplicity will take multiple forms, like personalized menus and toolbars in NT 5 and Office 2000.

Making things easy is difficult, in part because the OS's file system is too weak, Gates admits. It needs indexing and object-oriented extensions so it can save the state of the machine in the OS. In such a system, the operating system would have a schema that understood things like names, times, and places. This would allow for management not only of the network and names but also of the data within applications. Gates notes that such a radical change is "not imminent."

This was part of the original design of Cairo, which Microsoft started talking about in the early nineties.

But, Gates says, Microsoft had to start over and build up its database technology, such as that used in SQL Server 7.

Other changes down the line may include an alteration of the user interface to make using a computer easier. Microsoft remains a big believer in *social interfaces* such as the clipboard icon in Microsoft Office, and natural-language queries. Today, rich distributed

applications are too hard to build, scalability and reliability are too weak, and the lines between applications are too rigid. In a suite like Microsoft Office, Gates says, "the time has come; we have enough resources to remove the boundaries between applications."

In all these areas, I can only agree. But how well will NT 5 integrate with other systems? As we know, legacy systems—from mainframes to Unix-based hosts to previous versions of NT—don't go away. And though NT seems to be picking up momentum, it's not the only game in town.

A resurgent Novell just released a very strong upgrade to NetWare, and the company is pushing NetWare Directory Services. The "open systems" market seems to have converged around Linux and is gaining momentum rapidly. In the corporate arena, other Unix-based systems are still contenders. This competition is good for all of us; it provides an incentive for developers and advances the pace of innovation.

For me, I look at NT 5.0 and see lots of things I want on my corporate desktop. I see the strengths Microsoft is offering in NT 5 on the server but also the features that Novell and Linux offer.

Of course, none of these systems now does everything we want it to do. But in the meantime, we need to push for the things we want—easier administration, better scalability, and the ability for multiple operating systems to work together. OSs will get better, but there's no perfect system in sight. **PC**


MICHAEL J. MILLER



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UP FRONT

From the Editor-in-Chief.....4

Pipeline.....9

Letters.....21

Trends.....28

- E-mail you can wear
- Intel spearheads silicon security
- Inside PC Labs
- Color laser printers get more affordable

PCs.....35

- Home PCs and hand-helds

Software.....36

- Video editing

Peripherals.....38

- Removable storage

Internet.....40

- Web-based training
- Web audio

Networking.....42

- Remote access

First Looks.....45

- Sony Digital Mavica



- Adobe ImageStyler 1.0
- MS PhotoDraw 2000
- DVD, CD-R drives
- Nikon Super Coolscan
- MGI's PhotoSuite II
- Corex CardScan Executive

Second Looks.....80

- Online communities
- Iomega Zip Drive

COLUMNISTS

JAKE KIRCHNER.....30

BILL MACHRONE.....85

JOHN C. DVORAK.....87

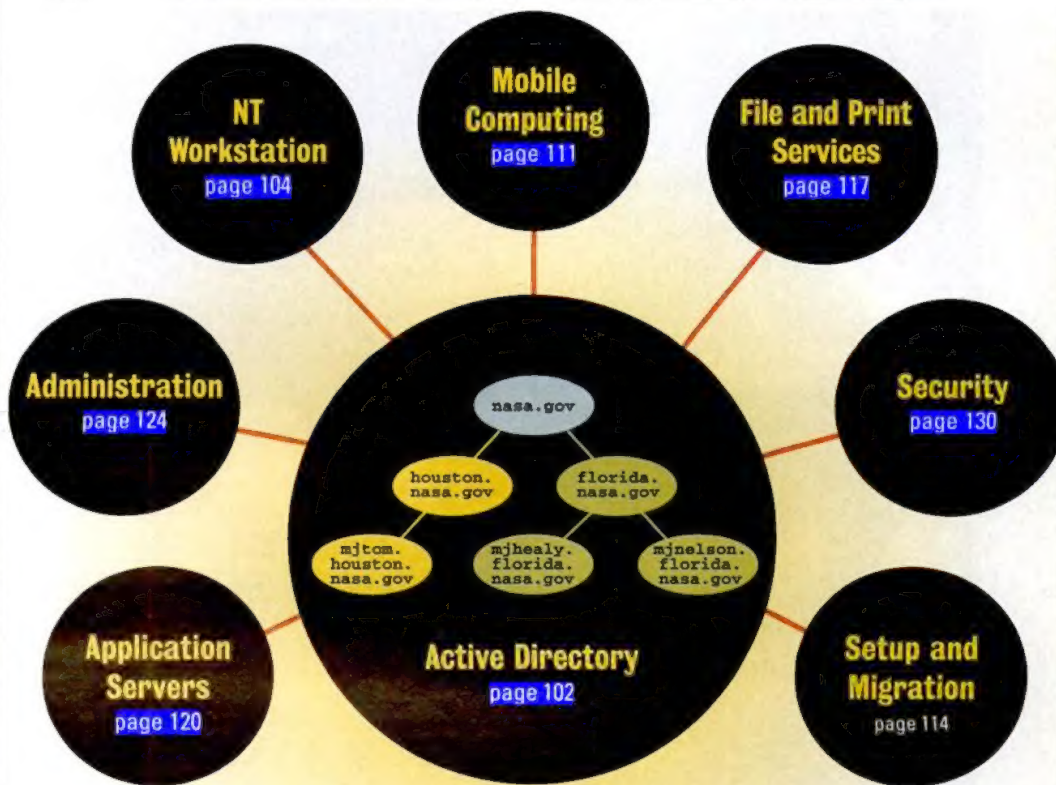
INSIDE TRACK.....89

JIM SEYMOUR.....93

BILL HOWARD.....97

COVER STORY

NT 5.0 PREVIEW



BY LARRY SELTZER

Any way you slice it, Microsoft Windows NT 5.0 looks as if it finally will embody all of the qualities corporate America looks for in an OS for servers and desktops. First and foremost, that means a fully distributed directory (finally!), but there's lots more. Come along as we assess beta 2 of this important OS.....100

Active Directory	102
Windows NT Workstation 5.0	104
Mobile Computing	111
Off-Line Folders	111
Setup and Migration	114
File and Print Services	117
Hierarchical Storage	117
Application Servers	120
Extended Server Memory	
Architecture	120
Administration	124
Security	130
Kerberos Support	130



INTERNET SHOPPING

Buy It on the Web

BY DAVID LIDSKY

If you're not already doing it, chances are you will be soon. Like maybe for this holiday season? Sellers of goods on the Web are working to make your Web buying experience a pleasant one. Here we review 43 e-commerce sites for everything from computer hardware to flowers. We scrutinized the sites from many angles to save you time and get you to the best store first. Shop till your fingers drop!135

Web Superstores	136	Shopping Agents: Books	160
Anatomy: Web Superstore	136	Music	160
Computer Hardware	137	Anatomy: Music Store	161
Anatomy: Hardware Store	148	Shopping Agents: Music	161
Shopping Agents:		Reel.com vs. Blockbuster	
Hardware	148	On-Line	153
Computer Software	153	Shopping Agents: Movies	153
Anatomy: Software Store	155	Internet Florist vs.	
Shopping Agents:		1-800-Flowers	155
Software	156	Shopping Agents: Flowers	155
Books	156	Auction Sites	140
Anatomy: Bookstore	160	Editors' Choice	137



E-COMMERCE SOFTWARE

Sell It on the Web

BY NELSON KING

The Web can be the great equalizer for small business—if only those businesses can get their sites working without too much trouble or going broke. We review ten e-commerce solutions designed just for small businesses. Each costs under \$2,000 for the first year—and many cost less.....163

Commerce Made Simple	169	ShopBuilder 2.5	195
IBM HomePage Creator for		Virtual Spin Internet Store	197
e-business	170	Yahoo! Store	199
iCat Commerce Online	178	Setting Up Shop	164
Internet Creator E-Commerce		Editors' Choice	165
Edition 4.05	182	The Costs of E-Commerce	168
MerchandiZer 2.03	187	Suitability to Task	168
Netcom Small Business Pack	187	Other Options	175
SecureMerchant 2.0	193	Summary of Features	196



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Net Tools

VPNs205

We test six virtual private network solutions.

From the Bench227

- Tivoli's IT Director 1.1
- Xeon servers
- NovaWeb 2001

PC TECH

Handling Data with SQL235

Learn how to use data manipulation statements.

Power Programming245

Implementing tooltips in dialogs and property sheets.

Utilities255

Page1 gives you a personalized entrance to the Web.

PC SOLUTIONS

User-to-User259

Ask Our Advisors262

AFTER HOURS

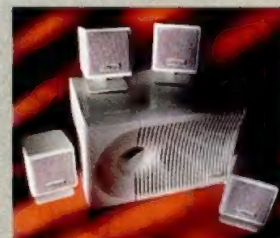
Combat Flights297

These five fighter sims put you in the cockpit.



Positional Sound403

Superior audio on your PC.



Also in This Issue:

PC Magazine Marketplace	274
BusinessCard	294
Coming Up	306
Editorial Product Index	310
Advertisers' Index: Companies	312
Advertisers' Index: Products	314
Abort, Retry, Fail?	320

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Pipeline

Polyester Panels

Polyester is back, and it may be the material of choice for future flat-panel displays. Researchers have recently made breakthroughs in developing thin-film transistor displays out of polyethylene terephthalate—a thin, flexible, and rugged plastic that you can roll up, fold, or bend into practically any shape you need.

How do you coax a seemingly inflexible, delicate display to perform such acrobatics? The answer is in the *roll-to-roll technique*. The conventional TFT is manufactured onto a rigid glass substrate, but the new technique calls for making the transistors on flexible plastic. In fact, plastic displays could be manufactured in much the same way that potato chip bags are produced, in which a giant sheet measuring, say, 12 feet wide by 1 kilometer long is spooled onto a machine that prints the packaging and cuts the material into individual chip bags.

But technical challenges still remain. This type of process of making semiconductors doesn't exist yet, according to Paul Carey and Patrick Smith, staff scientists at Lawrence Livermore National Laboratory's Information Science and Technology Program.

The concept holds promise

not only for a new generation of ultralight, flexible displays but also for cost savings. Since manufacturing plants will need to be retooled for the roll-to-roll process, start-up costs will be substantial. But the potential for cost savings in the long run because of cheap plastic and



FLEXIBLE: Researchers have developed the technology to make displays on flexible plastic.

mass-production techniques is also significant.

Although Carey says mass production of plastic displays is five years off (with appropriate investment), they could be used in all sorts of ways. The applications could include notebook and desktop displays, video game machines, and hand-held appliances, as well as displays that don't exist now—roll-up displays, displays sewn into clothing, and paper-thin electronic books and newspapers.

Distracted by Dirty Details

If you read the steamy Starr report on company time, you're not alone. The report, which was posted online on a Friday afternoon, drew an estimated 25 million downloads; 13.5 million of those downloads were in the workplace, according to a study by NetPartners Internet Solutions. Using an employee cost of \$35 per hour and a viewing time of 1 hour, NetPartners estimates that \$470 million was the cost to employers in lost productivity. "This one event demonstrates the enormous potential costs and risks of unmanaged Internet access for employers," says Cleve Adams of NetPartners.

Were You Starr-Struck?

22%

of respondents to a recent PC Magazine Online poll told us they'd used the Web both to read the Starr report and to watch President Clinton's taped testimony. But 51 percent of respondents told us they'd done neither online, and the rest had done one or the other but not both.

Katmai Is Coming

Recently Intel disclosed more information on Katmai, its upcoming multimedia instruction set designed to speed up advanced software applications. Katmai is a follow-on to Intel's MMX Technology.

Among the most important new instructions in Katmai is a new memory-streaming architecture. According to

Albert Yu, general manager of Intel's Microprocessor Group, "Without this new technique you fetch, execute, store, and wait before you do another fetch from the cache. With the new memory-streaming architecture in Katmai, you can basically fetch immediately without a wait. Performance

improvement varies depending on the application, but our preliminary data show about a 10 percent improvement on many advanced kinds of applications."

Katmai will appear in several

upcoming chips from Intel, the first of which will be based on 0.25-micron technology

and will run at 450 to 500 MHz. By next year—with chips code-named Cascades and Coppermine—the Katmai instructions will appear on 0.18-micron technology, with the chips running at clock speeds much higher than 500 MHz and having integrated Level 2 cache on-board.

Intel's 1999 Chip Lineup		
CODE NAME		SCHEDULED ARRIVAL
Katmai		First quarter
Tanner		First half
Cascades		Second half
Coppermine		Second half

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Pipeline

A 233-MHz Fanny Pack

Soon you'll be able to wear more than just a pager on your belt. In September, IBM Japan Yamato Laboratory introduced the IBM Wearable PC, a notebook computer that's about the size of a portable tape

The 320-by-240 display is attached to a headset; the TrackPoint is in a hand-held unit.

player yet packs a 233-MHz processor, a 340MB IBM Microdrive, a 2-hour battery pack, Windows 98, and IBM's voice recognition software ViaVoice.

The prototype's main unit slips in your pocket or straps to your waist; the controller, which contains the pointing device and micro-

phone, goes in your hand; and the microdisplay is worn as a headset, with the display perched on an arm extended about 3 cm in front of your right eye. You can maneuver the cursor and change screens

with the click button or use voice commands to open applications or read e-mail. The miniature machine also has USB and infrared ports and a CompactFlash card slot, and it supports a keyboard.

The IBM Wearable PC will likely show up first on

factory floors, where technicians will be able to refer to manuals—hands-free—as they work.



The IBM Wearable PC has a 233-MHz processor and a 340MB Microdrive.

Toward Open Source Code

Open source code has become the issue of the moment in the software industry. Microsoft has been hit from every side with requests for the source code for its OSs.

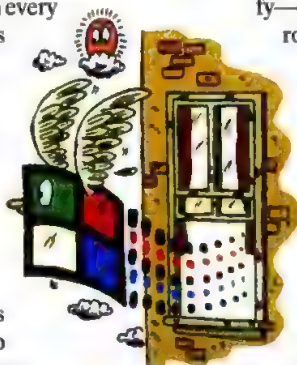
The Justice Department wants the source code from Windows 98 (competitors say the code exposes methods Microsoft uses to give its applications unfair advantages). AT&T recently settled a lawsuit against Microsoft involving efforts to get access to Windows NT source code. And on the Internet front, Linux—the free Unix server software—is grabbing headlines.

One reason for all the drama may be that open-source software—code anyone can modify—could play a major role in e-commerce.

"Five to ten years down the road, Linux could push out Windows NT or some other solution," says Bill Peters, a market analyst at International Data Corp. "But it's not as if any IT decision makers are going to replace a

NetWare or NT environment with Linux right now."

"However, as the number of new businesses on the Internet grows, Linux could likely emerge as the OS of choice for new projects related to e-commerce."



THIS ISSUE'S CONTRIBUTORS: Angela Hickman, Carol Levin, Sebastian Ruple, Don Willmont.

Was Microsoft Replaced?



The partnership recently announced between RealNetworks and Intel—which will license its software Streaming Web Video for RealNetworks' multimedia delivery system RealSystem G2—is of major interest, more for what the agreement doesn't include than for what it does. Microsoft, the software half of the "Wintel" duopoly as well as an investor in RealNetworks, has no role in the partnership.

The number of URLs that use streaming technology has tripled in the last nine months. And 85 percent of those URLs use RealNetworks' RealAudio, RealVideo, or both, according to the company.

Intel's close relationship with Microsoft usually keeps the two united on most fronts, making the deal remarkable. Though Microsoft is an investor in RealNetworks, Microsoft NetShow competes with RealNetworks' products.

Top-Selling Retail Business Software

Microsoft Windows 98 Upgrade	Microsoft
Microsoft Plus! 98	Microsoft
VirusScan 3	Network Associates
Norton AntiVirus 4.0	Symantec
Norton Utilities 3.0	Symantec
Norton AntiVirus 5.0	Symantec
pcAnywhere 32	Symantec
Microsoft Office 97 Upgrade	Microsoft
WinFax Pro	Symantec
VirusScan 3 Deluxe	Network Associates

Source: PC Data, data for August.

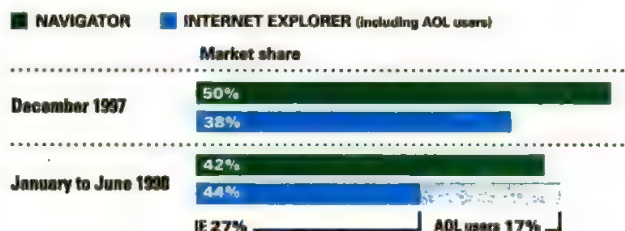
Linux Boosters

Linux—the alternative, free operating system—was boosted recently when Intel, Netscape, and two venture capital firms announced that they had made investments in Red Hat Software, a distributor of Linux. The investments were interpreted as blows to Microsoft, which is positioning Windows NT Server for Internet service providers (ISPs).

"The Linux OS is ready for enterprise-wide applications," says Robert Young, president of Red Hat. Microsoft president Steve Ballmer has confirmed that Microsoft is watching Linux closely.

Microsoft Pulls Ahead?

According to a new study from IDC, Microsoft Internet Explorer has surpassed Netscape Navigator in market share. Netscape disputes the numbers, because America Online users get Explorer by default. If AOL users are subtracted from Explorer's share, then Navigator maintains a market share lead over Explorer (42 percent versus 27 percent).



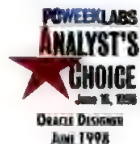
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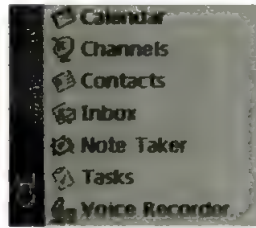
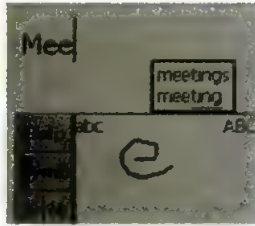


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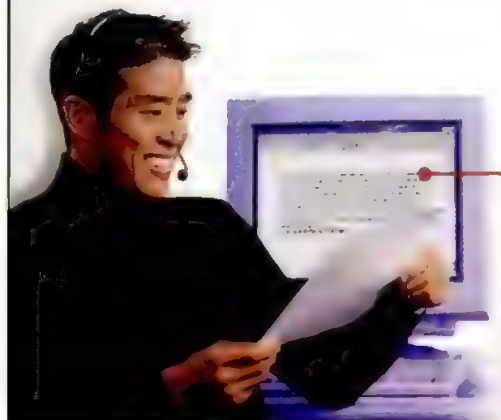
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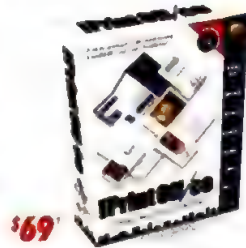


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Letters

THE MILLENNIUM BUG

I applaud your efforts to inform the general population about the Y2K issue ("What to Do About the Year 2000," October 6, 1998); I take exception, however, to several points made in Jim Seymour's sidebar "My Biggest Worry." Embedded chips are not as serious a problem as Seymour describes. In fact, in all of the Y2K testing to date, not a single report of a car or elevator malfunctioning because of Y2K has ever been substantiated. And who cares if the coffee maker isn't compliant?

RANDY BOBACK
Edmundston, New Brunswick, Canada

Although the concerns articulated in Jim Seymour's "My Biggest Worry" are valid, the size of the problem is overstated. The story implies that the hundreds of PLCs found in most cars as well as the thousands in power plants will stop working because of Y2K. This is just not true; only a few will have problems. But indeed, finding those few is a big task. Businesses need to inventory each computer (and PLC) to see which units use date settings that will cause Y2K problems.

To say something is Y2K-compliant is to say that it uses, processes, and displays dates as four-digit numbers. Many times two-digit dates are just fine, however, depending on how the dates are being used. If the display of a date is for human use only, then a two-digit date—although not Y2K-compliant—is not a problem. My own computer at home is technically not Y2K-compliant, in that the date rollover does not work correctly. This means that I will have to set the date manually on January 1, but it will continue to function.

DALE REISFIELD
via the Internet

I disagree with Jim Seymour's comments ("My Biggest Worry") about embedded computer systems with regard to Y2K. He mentions elevators specifically, along with other devices. I am an elevator technician by trade, so I know a great deal about elevator systems in general. Because elevator systems are "dumb" devices, they don't reference real time. Every time you power one down and turn it back on, its internal clocks start over from the beginning of its time. There may be some instances in which non-Y2K-compliant computer systems may be in control of elevator groups and may cause dispatching problems, but this is not the norm. Some elevator subsystems—one that controls the display over the elevator in a building lobby, for example—may be affected, but such a situation would not affect the operation of the elevators.

LUTHER L. POLLOK, JR.
Orlando, Florida



*And who cares if
the coffee maker isn't Y2K-
compliant?*

My biggest Y2K worry is the domino effect: One failure induces another. Your concern for the power industry provides an excellent example of a "first domino," which can cause any number of bizarre failure sequences. Our experiences during those first months will be the stuff of tragicomic stories we'll tell our grandchildren. I don't view Y2K as a few big bombs but as a million little firecrackers, each attached to the first domino of a long series of upright dominos.

ROGER S. HARRISON, JR.
New Jersey

The article "Testing Your PC Hardware" (October 6, 1998) contains a potentially misleading statement. You say the possibility that some machines will have problems "recognizing that 2000 is a leap year is nothing more than an urban legend." Years evenly divisible by 4 are not leap years if they are also evenly divisible by 100. Hence 2000 is not a leap year, and anyone who uses the simplistic "divide by 4" rule may well be in for an occasional unpleasant surprise. I suspect that it's worthwhile checking your machine's BIOS for such a problem (using the techniques described earlier in the same issue) and adding this problem to the list of algorithms to be verified during software testing.

GEOFF HART
via the Internet

In fact, a year divisible by 4 is normally a leap year, but a year that is divisible by 100 is not a leap year unless it is divisible by 400. Thus 2000 is indeed a leap year.—Ed.

I'd like to respond to a point Michael J. Miller makes in "Y2K: Reality and Myth" (October 6, 1998). I'd like to meet the programmers who used September 9, 1999, as a date flag, either as an invalid field or as end of file. Dates stored as numbers are stored in six-digit format; thus, September 9, 1999, would be 090999 (in *mmddyy* format) or 990909 (in *yyymmdd* format). I've known many programmers who used 999999 as a date flag, but no one I know would dream of using the date scheme Miller describes.

TONY HAYS
via the Internet

I enjoyed the information in your October 6 issue concerning the Y2K problem. Since I've been involved in Y2K testing at my company, it's a subject that concerns me. Although most of what you said is right on the money, I am moved to try to rebut one unfortunately common assertion that you and many others have made: that the use of two digits for the year was motivated by lack of storage on early computers. Since I'm one of those dinosaurs who have been programming in COBOL on mainframes since 1964, I feel amply qualified to discuss this subject.

Data set storage back then was generally on magnetic tape. Disks were rare and expensive and not widely used. RAM (or core storage, as it was then) was indeed limited—the first computer I programmed was an IBM 1401 with 4,000 characters of core—but since programs processed only one record at a time, the length of the record was essentially irrelevant.

Mundane as it may sound, the true reason is very simple: It never occurred to us to do anything else. I can't remember anyone ever raising the issue. Dates then as now were generally written *mm/dd/yy*, and this was carried over to programs. We also of course used Julian dates (*yyddd*) when necessary, and also on occasion formatted a date as *yy/mm/dd* or *dd/mm/yy*. Back in the sixties (and seventies and eighties) nobody gave a thought to Y2K, since it was generally assumed that nothing we were running would still be running then. I assume that there existed situations where four-digit years were necessary, such as interest calculations on long-term bonds and life-insurance projections, but these were relatively specialized applications and had no wider impact.

RICHARD DALIN
via the Internet

GLOSSY STORY

In your story "Professional Graphics" (September 22, 1998), I think your reviewers glossed over the bitmapping tools available

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Letters

in Canvas. The reason that Canvas is my first choice among these tools is that I can easily combine vector and bitmap objects. When I'm doing illustrations with lots of callouts, being able to work in one application is great. Also, although Visio isn't a full-fledged illustration tool, anyone doing illustrations ought to know about its capabilities. It has a unique approach, which is worthy of sidebar discussion.

Lastly, I was disappointed (but not surprised) that the article did not discuss product compatibility with Microsoft Office products. Difficulties in this area have been a problem for me for many years. My most recent experience involved a help-authoring project; I had problems working with fonts in Canvas objects when they were pasted into MS Word.

JANA BATTIN
via the Internet

MORE INFLUENCE, PLEASE

All of the companies in "The PC Magazine Most Influential Companies" (September 22, 1998) are influential indeed, but there are other companies that are more influential. For example, which company is arguably the most influential in the remote-connectivity industry? The answer, Citrix, is not on your list. Its WinFrame—which is based on the Windows NT 3.51 kernel—is a great remote-connectivity package, as is its new MetaFrame, which uses the Windows NT 4.0 kernel. Years ago, when my company was looking for a remote-connectivity solution, WinFrame was the only option, and it remains the best product still. Since Novell's Windows NT client will soon be available for both WinFrame and MetaFrame, these products can only get better.

Also, the order of your top 100 companies

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that we cannot answer letters individually. To send submissions for PC Solutions, please see the sidebar "How to Contact Us" on the last page of that column.

Corrections and Amplifications

In our First Looks review of the Toshiba Portégé 7000, "Four Pounds, Pentium II" (September 22, 1998, page 54), we printed the wrong toll-free phone number. The correct number is 800-867-4422.

In a First Looks review of notebook PCs ("300 MHz to Go," October 6, page 52), we mistakenly said that the Toshiba Tecra 8000 had the lowest battery-life score among the four units tested. In fact, the Compaq Armada 7400's score was lower by 13 minutes. We regret the mistake.

In our First Looks review "New REX with Data Entry" (October 20, page 60), we incorrectly stated that the REX Pro PC-Card Organizer has no memory usage gauge. It does have one.

is curious: In my opinion (and probably that of many IT developers), Novell definitely plays a much bigger role in IT decisions than Adobe or Netscape, which appear before Novell in your list. NetWare is still the dominant network operating system. Don't get me wrong—Windows NT is a great product (I use it)—but it definitely can't stack up to NetWare.

EVAN MINTZER
via the Internet

A GLOBAL PERSPECTIVE

I enjoyed your article about Web portals, "Home on the Web" (in your issue of September 1, 1998), although I don't care for the actual sites you mentioned in the story. You said that with most of them you can simply enter your ZIP code for local news and weather info. That works only if you live in the United States, however. The Web is a global medium, so it seems a little arrogant to focus on the U.S. sites. In your article, not one of your reviewers bothered to look at the services from a global perspective. You might argue that *PC Magazine* is a U.S. magazine. You are selling your magazine in newsstands, however; moreover, I receive my subscription in Germany. Open your eyes a little bit.

HARM-JAN WIERINGA
Hannover, Germany

A TERMINAL SERVER

I would like to respond to the CrossTalk dialogue between Toni Kistner and Frank Derfler (From the Bench, September 22, 1998) in your evaluation of Microsoft's Terminal Server. Kistner remarks of Terminal Server, "It's kind of a letdown after all of the hype. You plug it in and it works." Are we to conclude that simply because it works, it is a letdown? Maybe if it had crashed, Kistner would have found the product more exciting? Indeed I thought the product was a letdown also, but not because it worked—rather because of the abysmal performance that *PC Magazine* noted when only three clients were simultaneously spell-checking on a dual processor with 160MB of RAM.

Frank Derfler somehow thinks that in spite of this, "Terminal Server's real value is for vertical applications, such as a database server. You can run the database server inside the same PC that's running Terminal

Server...." Uh, excuse me, but if three clients doing word processing significantly load the system, why would running a database server on the same machine as Terminal Server be a "real value"?

JIM WASHINGTON
Reston, Virginia

MY COLLEGE IS BETTER

I read with great interest your lead Trends story "The Wired Campus" (September 22, 1998). Clayton College in South Metro, Atlanta, has to be one of the best-wired schools in the nation. Our Information Technology Project (ITP) has issued over 3,500 Pentium notebooks to all the students, instructors, and professors. Every computer is identically configured and equipped with Microsoft Office 97, an e-mail account from an off-campus ISP, a CD-ROM drive, an Ethernet card for access to the campus LAN, and a computer case. Our smart cards serve as our campus IDs, phone cards, and debit cards for the bookstore and vending machines. The impact of the notebooks has been tremendous. Novice users learn e-mail and PowerPoint basics at training classes, while our geeks get to build the local LAN. Students staff the repair and support facilities. Our ITP is a great program, but the cafeteria food still needs an upgrade!

DENNIS GROSECLOSE
Morrow, Georgia

MEL AND ME

Thanks to John C. Dvorak for mentioning the Michigan Electronic Library in his October 6 column, "This Time It's Personal." I am especially pleased that he finds the service more useful than Yahoo! Like him, I believe that the personal portal is the next "killer app" on the Web; unfortunately, many people have been slow to realize how much power this new medium gives them. MEL provides a uniquely Michigan point of view—heavy on automotive and Canadian information—but we also provide a no-nonsense resource for researchers and students who don't need the 2,345,645 hits that AltaVista brings up or the 15 dead Web sites from Yahoo! that come up, along with the 2 that are still viable but are not what they say they are.

SUSANNAH L. DAVIDSEN
via the Internet

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Trends

E-Mail in Your Palm

A new collection of mobile gadgets is calling you.

If you need to stay fashionable in the digital status-symbol department, read on. A new generation of mobile gadgets—from global satellite pagers to hand-held e-mail appliances—are now or will soon be ready to join your collection of mobile-computing necessities.

The uncontested pocket-size leader, 3Com's popular PalmPilot and Palm III series of hand-held companions, will have a successor sometime next year. But the company isn't revealing any details about products under development. According to market research firm Dataquest, 2.4 million hand-held computers were sold in 1997, up 75 percent from 1996. The PalmPilot led the way with 41 percent of the market.

In the first half of 1999, be on the lookout for the Palm operating system popping up on wireless phones. Qualcomm has already announced details about its upcoming pdQ Smartphone, a combination digital wireless phone and pen-based organizer that will run the Palm operating system. The pdQ Smartphone will have a 160- by 240-pixel LCD touch screen for display; data entry will be based on the Graffiti handwriting recognition system. You'll be able to use it to store your address book and appointments, receive e-mail and alphanumeric pages, and surf the Web.

PocketScience has come up with an innovative e-mail service called PocketMail, which will work with Sharp's upcoming TelMail hand-held gadget and with a similar unit from JVC. With a PocketMail appliance, you compose e-mail on a keyboard as well as transmit and receive e-mail over just about any telephone. As a subscriber to the \$9.95-a-month

PocketMail service, you dial a toll-free number on a telephone, hold the device's tiny acoustic coupler up to the telephone handset, and push a button. Outgoing messages are routed via telephone to the central PocketMail server and then transmitted over the Internet to recipients' e-mail addresses.

telephone to the central PocketMail server and then transmitted over the Internet to recipients' e-mail addresses.

This dizzying array of portable devices is only the beginning of a big trend.

Hewlett-Packard and IBM are among the first companies to have developed hand-helds based on Jupiter. The HP Jornada 820 Hand-held PC (introduced in October for less than \$1,000) is a 2.5-pound companion based on Windows CE, Handheld PC Professional Edition. The Jornada offers a built-in 56-Kbps modem, e-mail and Web access, and up to 10 hours of battery life.

Two-way paging is expected to gain some ground next year as well. The Personal Communications Industry, an industry trade group, projects that two-way paging subscribers will increase from 500,000 in 1998 to 1.5 million next year and 6 million in 2003. One pager riding this wave is the \$399 Motorola PageWriter 2000, introduced in the summer of 1998. It has a mini-keyboard, pointing device,

and backlit screen for composing, sending, and receiving e-mail and faxes. The PageWriter, which includes support for Lotus Notes, transmits and receives via Motorola's ReFLEX paging protocol.

The new \$250 BellSouth RIM Interactive Pager 950 can also send and receive text messages containing up to 2,700 words. Motorola also recently introduced its one-way Iridium Pager, the first global pager that communicates over the Iridium satellite network.

Offering a glimpse of what mobile gadgets may look like in the future, Compaq Computer's Western Research Lab and Systems Research Center in Palo Alto, California, has come up with the Itsy: a low-power, high-performance pocket computer. The Itsy prototype has a 200-MHz StrongARM SA-1100 microprocessor, a hires LCD touch screen, an audio codec, and 64MB of memory and runs on a pair of AAA batteries.

But don't look for the Itsy in stores. It's strictly a research platform, designed to encourage collaboration and development of next-generation computing appliances and software.—Angela Hickman and Carol Levin



Silicon Security

Is the computer industry lagging in the data-security arena?

At Intel's recent Developer Forum in Palm Springs, top executives from the company set data and content security as major goals for the PC industry. As the company releases its next wave of CPUs, Intel plans to implement several data-security initiatives directly in silicon. The overarching goal is to gather the industry around common data security architecture (CDSA).

According to Craig Barrett, Intel's president and CEO, there are now "maybe 150 million or so computers connected over the Internet." By the year 2005, Barrett foresees a



billion Internet computers. The possibilities for communications and e-commerce applications will be enormous, he says, but the applications will have to be completely secure.

Intel is spearheading a series of industry efforts to improve security in areas such as user authentication, content management, and electronic commerce. The company is backing the Digital Transmission Content Protection (DTCP) initiative, which both the American and the Japanese governments have embraced. DTCP is similar to the approach in which digital content is encrypted and unencrypted, used in the DVD industry.

Digital-content protection is crucial in order to move forward the 1394 Firewire interface, which Intel plans to build into its chip sets within the next two years. The 1394 interface is designed to convince hardware manufacturers to move away from the ISA bus and internal PCI slots. Intel is working on several security technologies that will be built into its CPUs and chip sets over the next two years, including random-number generators and digital-signature technology.

"Cooperation is no longer a nice thing for the industry; it's a competitive necessity," says Pat Gelsinger, vice president of Intel's Desktop Products Group. "You do it or you die."
—Sebastian Rupley



Caught Speeding



Lately, an unusually large number of overclocked processors have come through PC Magazine Labs. In testing for our usual year-end roundup of business PCs, due next issue, we encountered six machines whose Pentium II CPUs were running significantly faster than they were designed to run. Though a Pentium II/333 clocking at 375 MHz may increase a machine's performance in the short term, overclocking is not recommended by PC Magazine Labs or by Intel. Overclocking increases the likelihood of heat damage and data corruption and voids Intel's warranties.

The six systems were sent for review by four different PC manufacturers: Aberdeen LLC, Highwave Technologies, Mega Computer Systems, and Tangent Computer. Two of the machines were outfitted with the Pentium II/333 yet ran well above 333 MHz, and four arrived with overclocked Pentium II/400s. All initially scored much higher than we anticipated under our CPUmark benchmark tests, which measure the CPU subsystem, and were proven to be overclocked by a timing routine in our benchmark test suite that verifies CPU clock speed.

After investigation, we discovered that

According to AMI, BIOSs containing this "manufacture setting" were designed at the request of SuperMicro Computer, which supplies the motherboards for the five machines in question. "End users will often overclock their systems," says Mark Huffman, software sales manager at AMI, "so SuperMicro asked us to provide a way of easily testing boards at overclocked speeds." Similarly, the sixth system—the Highwave machine, which uses a FreeTek motherboard—was overclocked via a setting in a BIOS from Award Software International.

When asked about the issue, Aberdeen, Highwave, and Mega pleaded ignorance, denying that they were aware of any overclocking. Tangent admitted changing the "manufacture setting" in its systems' BIOSs, but it said SuperMicro had kept it in the dark about the setting. Both FreeTek and SuperMicro deny involvement, saying they overclock motherboards only for in-house testing and do not ship them overclocked.

Whatever the real story, the vendor that actually assembles and sells the PC is to blame in the end. If Aberdeen, Highwave, Mega, and Tangent did not overclock their systems, then their quality control is poor.

Fast Times

While testing for the next issue's roundup of business PCs, we encountered six machines whose processors had been inappropriately overclocked via settings in their BIOSes.

Machine	Motherboard	BIOS	Processor	Clock speed
Aberdeen Inverness D50	SuperMicro	AMIBIOS 2.5	PII/400	412 MHz
Highwave Scorpion 400	FreeTech Award	Award 4.51PG	PII/400	448 MHz
Mega Impact PII 333 64MX	SuperMicro	AMI 0706981600 R1.2b	PII/333	342 MHz
Mega Impact PII 400 128ProIMX	SuperMicro	AMIBIOS 2.5	PII/400	412 MHz
Tangent Medallion BX 300	SuperMicro	AMIBIOS 2.5	PII/333	375 MHz
Tangent Medallion BX 400	SuperMicro	AMI 0706981600 R1.2b	PII/400	412 MHz

in each case the system bus and processor had been overclocked via a hidden setting in the machine's BIOS. Five of the systems use a BIOS from American Megatrends Inc. (AMI) whose setup screen obliquely lists a "manufacture setting." There are five options for this setting, listed merely as "Mode 0," "Mode 1," "Mode 2," "Mode 3," and "Mode 4." As we suspected and as AMI later verified, each option above Mode 0 or Mode 1 (depending on the processor) boosts the speed of the system bus and, thus, processor speed.

Intel warns against overclocking its processors, and the company validates chips only at official speeds. "Overclocking your processor is like driving your car at 70 mph in first gear," points out Intel spokesperson Manny Vera; "you can do it, but it could cause problems down the road."

Using our benchmark test suite, which you can download from the Ziff-Davis Benchmark Operation Web site (www.zdbop.com), you can easily verify a system's clock speed yourself.—Cade Metz

Color Lasers Get More Affordable

They're \$2,000, without cutting corners.

The entry fee for color laser printing is falling rapidly—both for letter-size printers, which are suddenly far more affordable than they've been, and for tabloid-size printers, which weren't available at any reasonable price until now.

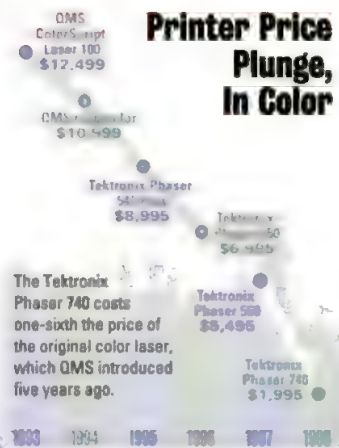
Tektronix gets the award for lowest announced price for a letter-size color laser so far, with its new Phaser 740 series. The Phaser 740 (\$2,000 street) not only is the first color laser coming out of the gate for under \$2,000 but hits that price without cutting corners. The network-ready Phaser 740 is a replacement for the about-to-be discontinued Tektronix Phaser 560 (which was a 1997 Editors' Choice), at half the Phaser 560's current price. Tektronix says the price difference comes primarily from economies of scale rather than from any technological innovation.

More interesting in some ways is the Phaser 740L (\$1,500 street), a color-capable printer that can output 16 pages per minute (ppm). To add color (at 5 ppm), you need only buy a set of color toner cartridges for \$550 and snap them in.

Tektronix isn't alone in reducing the cost for color lasers. Minolta has announced the Color PageWorks Ex, due in December, and the Color PageWorks L, due in January. Both are rated at 12 ppm for monochrome and 3 ppm for color. Although Minolta hasn't set prices, the company touts the PageWorks L as the most affordable color laser printer in its class. Hewlett-Packard may be about to jump into a lower price level as well.

For tabloid-size printers, the big news is simply that they're now available for prices starting at \$5,000—or roughly the price of some letter-size color lasers—instead of prices starting at tens of thousands of dollars. Lexmark, QMS, and Tektronix are expected to announce printers in this category by the time you read this.

Printer Price Plunge, In Color



Tektronix also gets the prize for least expensive tabloid-size color laser, with a printer costing \$5,000 (street). The Phaser 780, due in early December, has a rated speed of 16 ppm for monochrome or 4 ppm for color. The QMS magicolor

330, due by the end of the year, virtually ties the Phaser 780 in price (\$4,500), paper handling, image size, and rated engine speed. Lexmark's currently shipping tabloid-size entry, the Optra Color 1200 (\$6,000 street), offers 12 ppm in both monochrome and color. Finally, Hewlett-Packard may also be about to jump into both of these markets. Rumor has it that HP will soon have a new letter-size color laser and its first tabloid-size color laser.

—M. David Stone

JAKE KIRCHNER

Whatever Happens, You've Been Warned

The first of many daily reminders that life is dangerous greet me every morning on the commuter train platform. There, a series of signs warn me to "MIND THE GAP WHEN BOARDING THE TRAIN" and caution me of "DANGER! 750 VOLTS!" awaiting anyone who missteps and tumbles onto the track. So "WATCH YOUR STEP!"

Once I'm safely arrived in the city, the station escalator to the street advises me in print and recorded announcements to "HOLD THE HANDRAIL" and "WATCH THE SIDES." The four-block walk from the station to the office is a sprint through a minefield of "DON'T WALK" signs; blue wooden police barricades ordering me, "DO NOT CROSS"; and orange safety cones informing me of "MEN WORKING ABOVE." Only when I've negotiated my way into the building—"CAUTION, REVOLVING DOORS"—and through the sets of combination-locked doors—"CLOSED AT ALL TIMES FOR YOUR SAFETY"—do I reach the sanctuary of my little office and the comfort of my first cup of coffee—"CAUTION, VERY HOT!"

I tell you, I feel as if I cheat death every day just getting to work.

But once I'm in my office, surrounded by my computers, my plants, and my friendly coworkers, I can forget the trauma of the trip. That is, after I've entered the five separate passwords required before my computers are up and running—a daily reminder that people are trying to hurt me through technology.

Even with passwords, personal computing until recently has been an oasis of tranquility and safety in a very dangerous world. PC vendors have not felt the need to warn us against dangers lurking in our hardware and software. Computer keyboards don't carry repeti-



tive-strain injury warnings, monitors don't caution us against eyestrain or radiation. Maybe they should, since we know that there are real ergonomic problems associated with prolonged use. But the greatest danger most of us face is that we might drop some piece of hardware on a foot or get a nasty paper cut loading a printer. As a result, our offices have been comfortably free of warning notices.

The year 2000 crisis is changing all that. Suddenly just about every maker of computer hardware and software has rushed to assure us that its products—and our data—won't suddenly melt down at the turn of the century. Perhaps you haven't noticed the year 2000 disclaimers popping up all over, just large enough to let the vendors assert a complete lack of liability for any year 2000 glitch.

The other day I picked 15 leading hardware and software vendors at random. Visiting their Web sites I found that all but one—Intel—address the Y2K issue on their home pages. (Intel does have extensive information on the topic elsewhere on its site.) At every site the message is the same: Our products are fine if used properly. But the companies invariably introduce these reassurances with large DISCLAIMER headings:

"THIS STATEMENT OF YEAR 2000 COMPLIANCE DOES NOT CONSTITUTE ANY ADDITIONAL WARRANTY."

It's enough to make you feel insecure. Contemplating what might come next only makes the situation worse. Those of us who travel a lot have noted that on some flights airlines are asking us to list our next of kin. You know, just in case. If I start seeing warnings like that on my computer, I'm staying home.

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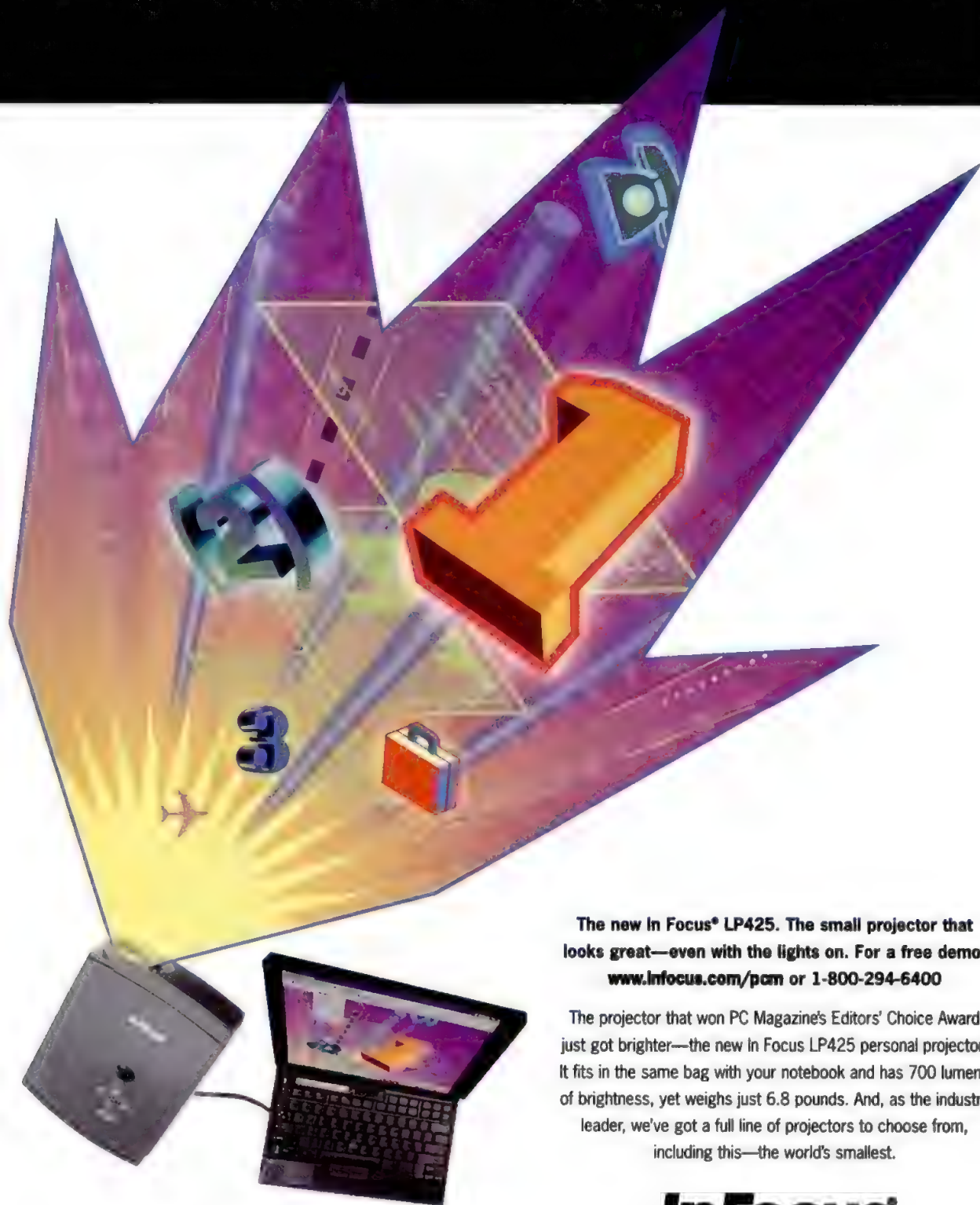


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HAND-HELDS

Personalized Preferences

As the wait continues for Microsoft's new Windows CE hand-held PC Professional platform, code-named Jupiter, those people currently wishing to purchase a PC in miniature must look elsewhere. Luckily, there's no almost no end to the alternatives.

Users willing to spend one or two grand—which is likely to be the cost of most Jupiter devices—may opt for the so-called mini-notebook, a machine à la the Toshiba Libretto that runs Windows 95 yet weighs under 2.5 pounds. Users with less to spend may opt for—in descending order according to weight and functionality—a Windows CE 2.0 device priced between \$500 and \$1,000, a hand-held in the vein of 3Com's \$200 to \$400 PalmPilot, or a \$100 to \$200 PC Card PDA.

New this fall are Royal's **daVinci** and the **daVinci Pro**, (less-expensive competitors to the PalmPilot) and the **Phenom Express** from LG Electronics (a Windows CE 2.0 unit that users can later upgrade to Jupiter).

Royal Consumer Business Products (908-526-8200, www.royal.com), a division of Olivetti Office USA, has entered the ever-growing PDA market with a more-affordable competitor to the popular Palm Pilot. The **daVinci**, priced at under a \$100 retail, is a pen-based hand-held that allows for data entry via an on-screen keyboard, an on-screen writing pad, or—optionally—an adjunct folding keyboard. The unit resembles the Palm Pilot in size, weight, and ex-

ternal design. Only slightly larger than a deck of cards, it measures 3.3 by 4.9 by 0.7 inches (HWD), weighs 6 ounces, and integrates a 160- by 160-pixel backlit display. As is typical of



POCKET FRIENDS:
New hand-held devices from LG (left) and Royal.

this hand-held genre, the unit is primarily a Personal Information Manager (PIM), offering 256K of memory and standard organizational applications

such as a telephone directory, a calendar, a memo pad, and a common calculator.

Though Royal stresses the **daVinci** can be used as a stand-alone device without a PC, the company does provide a docking cradle and synchronization software for sharing data

with the PIM application loaded on your PC.

The **daVinci Pro**, a sibling priced at \$150 retail, is slightly more powerful, providing a full 1MB of memory, built-in e-mail and fax software, and a 160- by 240-pixel display. To use its e-mail and fax software, you need your own PC Card modem, which plugs conveniently into the unit's docking cradle.

The **Phenom Express** from LG Electronics (201-816-2095, www.lgphenom.com) is more a com-

munication device than PIM. Measuring 9.3 by 5.9 by 1 inches and weighing 1.65 pounds, the unit has a built-in 56-Kbps V.90 modem and comes preloaded with a setup wizard for quick and easy attachment to the Internet.

Similar to most Windows CE clamshells, the device integrates a comfortable keyboard and a 640- by 240-pixel color display as well as a healthy compliment of I/O connections: a VGA port for giving PowerPoint presentations on an external monitor, a parallel port for printing, a serial port, an infrared port, and a PC Card Type II slot.

Along with the Windows CE 2.0 operating system, LG loads Pocket Office (which consists of Excel, Word, and a PowerPoint viewer), bFax Professional, Pocket Finance, Pocket Internet Explorer, Pocket Outlook, and several other titles. In addition to 16MB of RAM memory, the unit holds a 16MB of ROM, which can eventually be upgraded by the user to the Jupiter OS.—Cade Metz

PCs

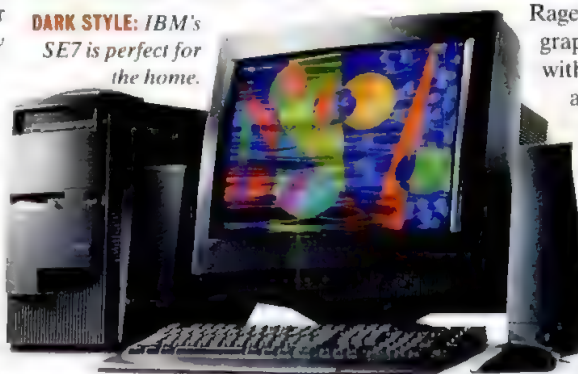
Home Revolutions

Speed is not just for power users. Making its way into an increasing number of home systems is Intel's latest speed bump, the 450-MHz Pentium II CPU. Both Compaq Computer Corp. (800-888-0220, www.compaq.com) and IBM Corp. (800-426-7235 ext. 4340, www.ibm.com) have both bumped their home line offerings up to include 450-MHz systems.

In addition to utilizing the 450-MHz CPU, the **Compaq Presario 5660** (\$2,499 list) comes standard with 128MB of SDRAM, a 12GB hard disk, 100-MHz system bus and 512K of L2 cache, 10-Mbps Ethernet port, and a 56-Kbps V.90 modem. Multimedia elements include a DVD-ROM drive with DirectShow, PCI

audio, and a second-generation AGP graphics card powered by the ATI 3D Rage LT Pro accelerator. Unique to this forward-looking system is the graphics card's

DARK STYLE: IBM's SE7 is perfect for the home.



support of a digital flat-panel display. The system comes with Compaq's Easy Internet Access Keyboard, which offers four shortcut buttons for speedy access to your Internet applications.

The specs of the similarly priced **IBM SE7** (\$2,399 list) differ from those offered by Compaq. Housed within the SE7's sleek, black chassis is 128MB of SDRAM, a 16.8GB hard disk, a 100-MHz system bus, 512K of L2 cache, and a 56-Kbps V.90 voice/data/fax modem. The system also features on-board ATI Rage Pro Turbo AGP 2X graphics accelerator with 4MB of SGRAM and a DVD-ROM drive with DVD-video playback software.

To increase your surfing and browsing pleasure, the SE7 comes with IBM's Rapid Access keyboard and the IBM ScrollPoint mouse; the latter embeds IBM's famed pointing stick between the mouse buttons, whereas the former features 14 quick-access shortcut keys.—Melissa J. Perenson

RECAP PC Magazine reviewed ten hand-held PCs in our issue of March 10, 1998. Editors' Choice was awarded to the Franklin Rex-3-DS PC Companion, the Psion Series 5 Hand-held Computer, and the 3Com PalmPilot Professional.

VIDEO EDITING

Video for the Masses

Looking to edit out that inopportune moment from your home vacation video? Or maybe you want to put together a short video of baby's first birthday for grandma. No matter what your goal, as more and more peripherals offer consumers the opportunity to capture digital video, this market segment continues to grow and evolve.

The goal, of course, is to make digital video editing fun, easy, and accessible for home users. And new products from MGI Software (888-644-7638, www.mgisoft.com), Ulead Systems (310-523-9393, www.ulead.com), and Avid Technology (800-949-2843, www.avidcinema.com) strive to achieve just this.

Based on the core engine of Ulead's professional video-editing solution, MediaStudio Pro, **VideoStudio 3.0** (\$100 street) has been jazzed up with a new, more intuitive user interface and a step-by-step approach that walks you through all aspects of video creation—from adding titles, special effects, and incorporating sound and music, to utilizing any of the

60-plus transitions. The Video Wizards program takes novices through the basics of video editing, helping them capture clips, then arrange the clips in the desired sequence, and output the project to a video file. Supported formats include the standard AVI, MOV, and MPEG formats, as well as streaming formats like Microsoft NetShow's ASF and RealNetworks Real Media RM.

The package has both storyboard and timeline views. After completing your video, you can use VideoStudio's Multimedia Greeting Card to send your video by e-mail.

Straddling both the home and business markets is the updated **MGI VideoWave 2.0** (\$100 street). The interface has been revamped to improve the ease of navigation and incorporate VCR-like controls. Like Ulead's VideoStudio, VideoWave 2.0 allows you to storyboard your video project.

In addition to capturing video and still images, now the software lets you directly control digital video devices, as well as capture and transfer video to and from your camera. You can also capture and edit audio from within VideoWave 2.0 and sync audio and video captured from separate sources. You can add up to 13

with a selection of over 50 different transitions to separate your scenes. The Dark Room lets you use slider controls and preset filters to adjust the brightness, contrast, and color of your video. A new enhancement to this version is in the titling features, which now support drop shadows, outlines, special effects, and transparency of the titles.

Once you've completed your project, which is built using VideoWave's MPEG-1 encoder, you can output your video to a VCR or any digital video device.

Due out this season as well is Avid Technology's **Avid Cin-**



VIDEO EXPRESS: Create your own videos with MGI VideoWave 2.0 (above) and Ulead VideoStudio 3.0.



additional stereo audio tracks to your video.

The Produce Wizard helps guide newcomers through the steps of creating a video. Once you find a pattern that you like, you can define and save production templates for reuse with your next video project.

Enlivening your video is easy

oma for Windows, the first Windows-based video editing and publishing product for consumers from this video veteran.

Based on Avid's high-end engine that's used in Hollywood, Avid Cinema aims to maximize consumers' video-editing experience. You can capture video directly within Avid Cinema and then use storyboard templates designed by professional screenwriters to build your video project. The program supports drag-and-drop editing for arranging your video and audio clips and provides over 60 special effects that can be applied to your video. You can also add voice-overs, sound tracks, animated titles, and credits.

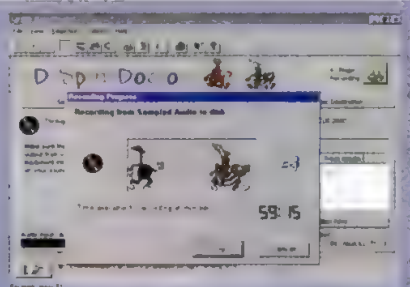
When finished, Avid Cinema lets you export your completed movie to videotape or CD-ROM as either an AVI or MOV file. In addition, like Ulead's VideoStudio, Avid Cinema supports exporting of files to RealNetwork's RealMedia streaming video format.—*Melissa J. Perenson*

Spinning Disks

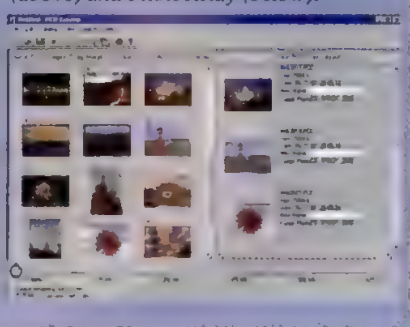
In an upgrade to its flagship CD-Recordable software, Adaptec (800-442-7274, www.adaptec.com) has introduced **Easy CD Creator Deluxe 3.5**. (\$99 list). Having already proven itself as a powerful utility, Easy CD Creator focuses, in Version 3.5, on improving consumer-oriented features rather than changing the core recording engine.

For instance, the CD Spin Doctor has been improved, allowing users to record CDs from analog sources while applying real-time effects and enhancements. You can, for example, record an LP or cassette to CD while you remove hiss and pops in the same step. And with the new PhotoRelay, users can easily use their digital images and video to create CD-based digital photo albums, multimedia slide shows, and video postcards.

Also new is Adaptec DirectCD 2.5 (\$69 list) which allows you to use a CD-RW drive just as you'd use a standard floppy disk drive. Enhancements to DirectCD include a simplified user interface, improvements in data writing speed, and support for some CD-R drives running under Windows NT; the product also has a ScanDisc feature, which can be used to recover data that has been lost due to a data-writing error.—*Matthew Graven*



CD CREATION FUN: CD Spin Doctor (above) and PhotoRelay (below).



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- 16-Bit Wavetable Sound & Altec Lansing® Speakers
- V.90 56K³ Windows Modem
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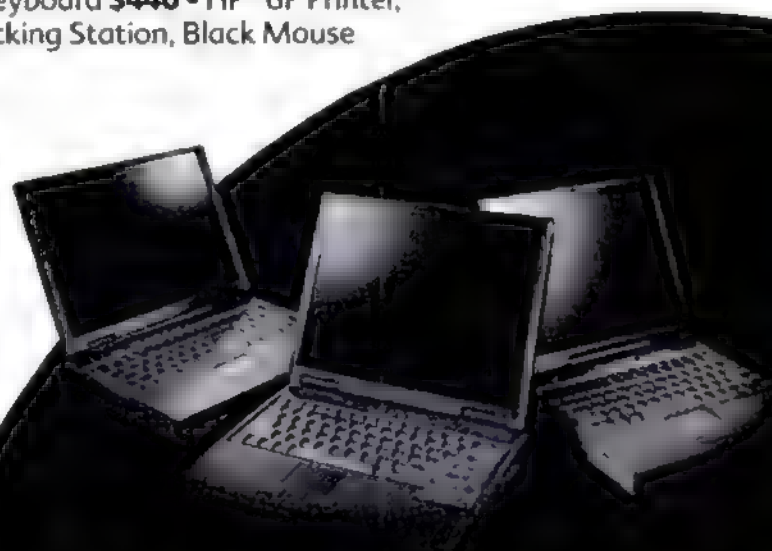
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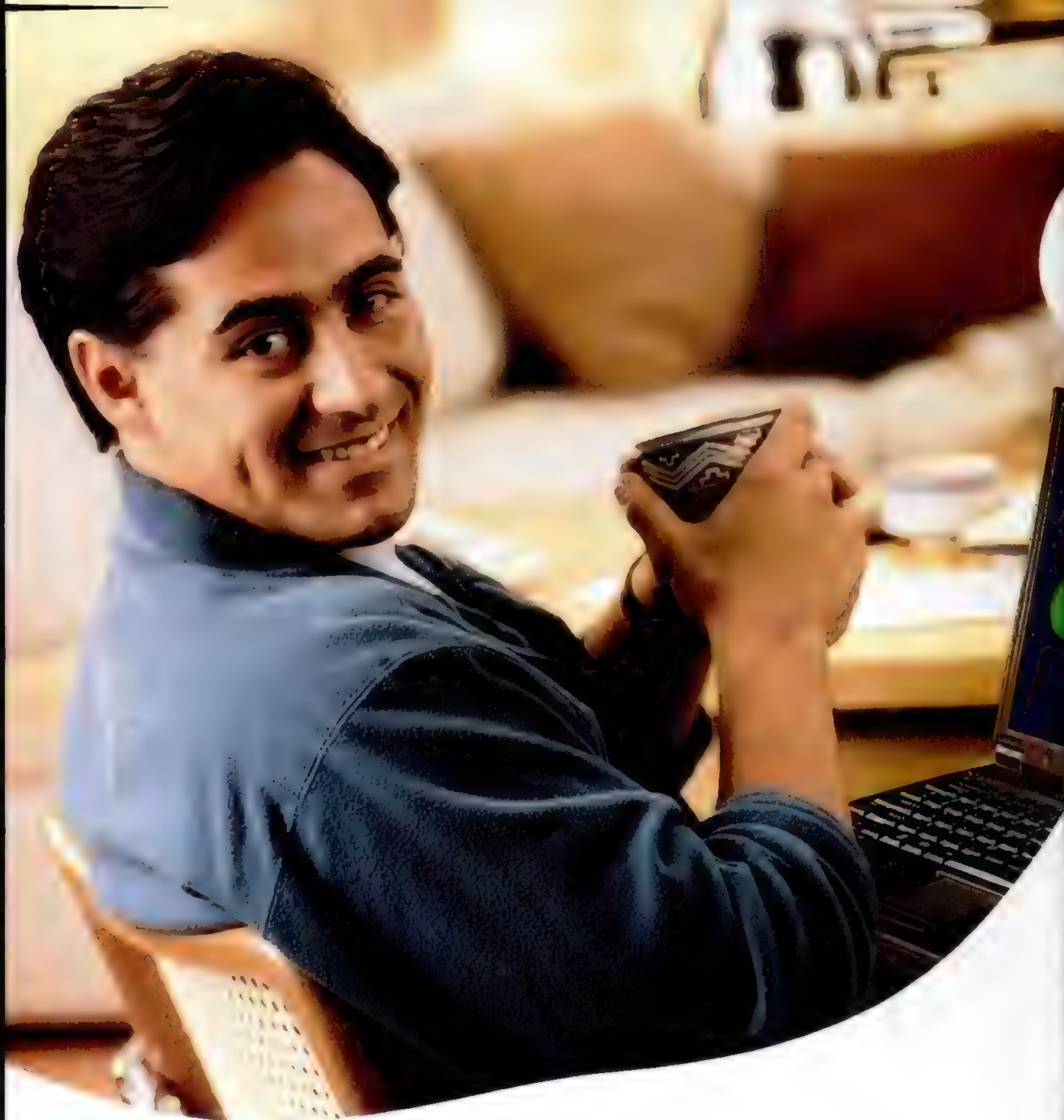
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TELEPHONY

Computerized Voice Mail

The convergence of PCs and ordinary home and office equipment has begun, and thanks to some clever hardware (and software) engineering, you can now leverage the power of your PC to improve one of the more ordinary pieces of technology: the telephone.

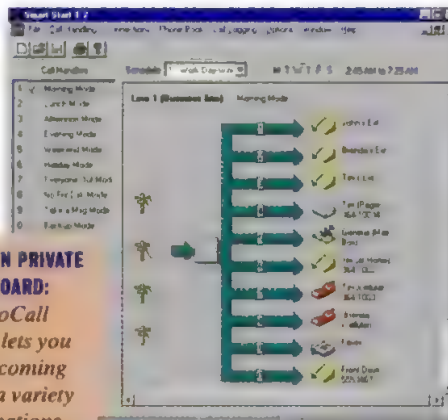
Today, many homes and small businesses subscribe to a voice mail system, to Caller ID, and even to distinctive ring services that identify callers. Although you'll still need the phone company in order to use these features, the latest phone automation product from SoloPoint (888-765-6225, www.solopoint.com) lets you consolidate these different services into a single interface that you can customize and modify yourself, with the help of a PC.

SoloPoint's **SoloCall C-120**

(\$495.95 list) is an "electronic receptionist" that stands between you and your voice mail service, allowing you to screen calls and route them to various accounts or phone numbers. You don't need a PC to operate it, though you can connect the device to a PC via its built-in serial port.

SoloCall lets you set up automated voice mail menus that allow people who call you to choose from a variety of options, such as ringing a different phone, leaving a message, or forwarding the call to a remote location or mobile phone. You can also use SoloCall to route incoming calls or give customized messages based on who's calling, using Caller ID or distinctive ring patterns. Perhaps the most unique

YOUR OWN PRIVATE SWITCHBOARD:
The SoloCall console lets you route incoming calls to a variety of destinations.



feature of the SoloCall system is its call-screening function. This feature allows you to use any off-site touch-tone or mobile phone to listen to and then selectively take your calls.

If you want to arrange all of these settings on a PC, you can use the bundled SmartStart software, which provides a graphical representation of your call-routing options and makes adding and deleting numbers from your

automated call lists much simpler.

Another, somewhat similar telephony product that is geared for home and home-office users (rather than business travelers) is available from Microsoft Corp. (800-426-9400, www.microsoft.com). For our hands-on review of the 40-channel **Microsoft Cordless Phone System**, see this issue's First Looks section.

—Adam Asch

REMOVABLE STORAGE

Tiny Drives, Big Capacity

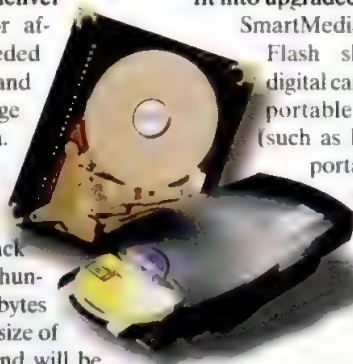
One obstacle impeding the progress of mobile hand-held devices is removable storage: The two most viable options right now, CompactFlash and SmartMedia, don't deliver the capacity or affordability needed for storing and sharing large amounts of data.

The latest innovations in miniaturization will pack tens—and even hundreds—of megabytes onto media the size of a matchbook and will be designed for PC Card connections and removable flash memory slots.

In early September, IBM Corp.'s Storage Systems Division (800-426-2968, www.storage.ibm.com) announced plans to enter

the ultra-slim storage market with its new **MicroDrive**. Based on hard disk technology and an internal platter about the size of a small coin, the MicroDrive will fit into upgraded versions of the

SmartMedia and CompactFlash slots found in digital cameras and other portable peripherals (such as PDAs and sub-portable PCs). It will sell in two versions, 170MB



PINT-SIZE DISKS:
Future removable storage products from IBM and Iomega.

and 340MB, and will measure about 1.7 by 1.4 inches, with a thickness of 0.2 inches.

The MicroDrive is currently being reviewed by Canon, Hewlett-Packard, Hitachi, and Minolta for integration into future mobile

and hand-held products. Don't get too excited yet, though: The MicroDrive won't be on sale for at least a year.

In the meantime, don't count out Iomega's 40MB **Click!** (800-697-8833, www.iomega.com), which has been long anticipated but is still not available. It should finally arrive on store shelves after the new year.

The Click!'s 40MB disks (\$10 street each) will have dimensions similar to flash-memory media (2.2 by 2.0 inches, with a thickness of 0.08 inches), but they won't fit into a removable flash memory slot. Instead, they'll slip into a proprietary slot in Iomega's own

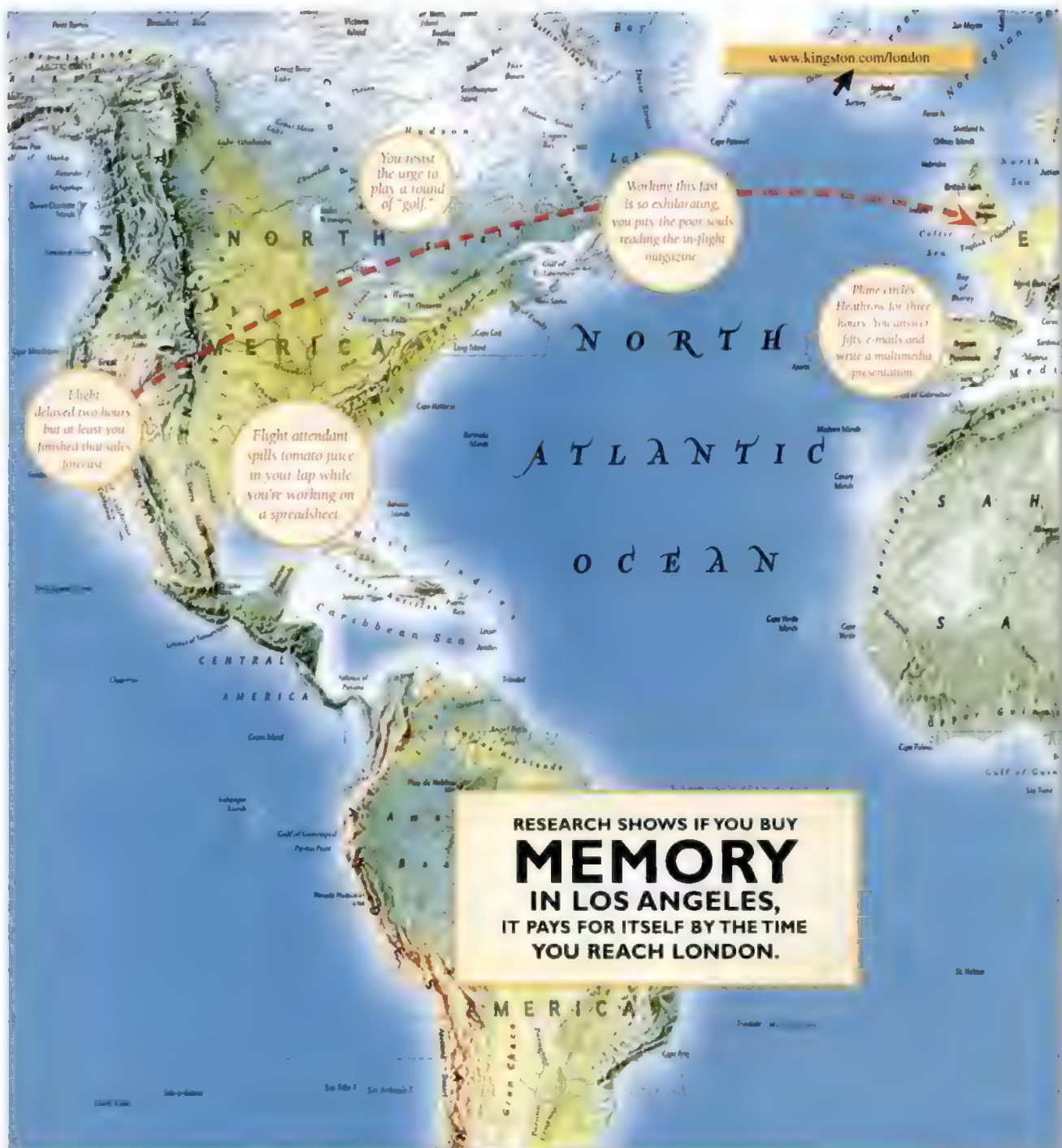
portable Click! drive (\$200 street), which itself will be small enough to fit into a shirt pocket. The drive will attach to desktop or notebook PCs and PDAs using standard serial or PC card connections, and to digital cameras via a flash memory adapter. Iomega is also working on a battery-operated model that could be a boon for photographers.—Josh Levy

No PC Required

Digital cameras continue to grow in popularity, and ink jet printers have improved to the point where their output is nearly indistinguishable from true photographic prints—particularly on glossy paper. Marrying these two trends is a new breed of printer that lets you print out your photos directly from the miniature flash memory cards used by today's newest digital cameras.



One of the first out of the gate is Lexmark International (800-539-6275, www.lexmark.com), which has unveiled the new \$350 (street) **Photo Jetprinter 5770**—a new version of its best ink jet, which includes a small LCD panel and a slot for CompactFlash and SmartMedia cards. Simply insert the card and scroll through the digital images; you can print just the ones you want, without needing to download them to a PC first. There's also built-in firmware that lets you perform basic editing and cropping functions—and even panoramic stitching—using only the external controls.—JL



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Trends Internet

WEB-BASED TRAINING

Long-Distance Instruction

At one time, training your company's employees or pitching presentations required steep travel expenses. Now, that's no longer the case—even if the trainers and learners are dispersed around the world. Although there are a host of products that prepackage instructional material for the Web, there's something to be said for having a human being at the other end of the Internet connection when you're trying to learn something.

Contigo's **Internet Conferencing System (ICS)** (619-278-5900, www.contigo.com) gives instructors a console to control the display of Microsoft PowerPoint or Corel Presentations to logged-in learners on the Internet. The presentations features are divided into three phases: before, during, and after. In the before stage, you invite attendees and produce and promote the show.

During the presentation, the in-

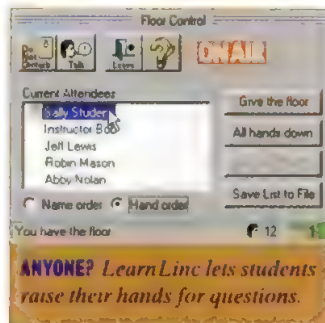
structor can highlight screen areas with either a pointer or by shading. The instructor can also use collaborative browsing (which controls the attendees' browser navigation), distribute office documents and multimedia files to the online classroom, and use whiteboard and polling features.

In the after phase, as the instructor, you can survey participants, send follow-ups, or play back a recording of the session for people who missed it the first time.

Though users might want to combine ICS with teleconferencing, the program offers private and public text chats. Since the software uses only standard Internet and Java code, it will pass through most corporate firewalls. Pricing, which includes

a custom extranet Web site, starts at \$9,995 for up to 5 presenters and up to 25 remote audience members.

Given its support for student participation, assessment, and observation, **Ilinc's LearnLinc 3.0** (518-283-8799, www.ilinc.com) is an In-



ternet-based server program that is geared more specifically toward corporate training than to presentations. To participate, a student can indicate his presence by

raising an electronic hand, which shows up as a hand icon next to his name in the instructor's console.

The instructor can give a student the floor in the chat window or peek at what's on a student's screen with the Glimpse feature. The instructor can also issue quizzes to test how well members of the virtual class are learning.

The real power of LearnLinc comes from its synchronized Web navigation and its shared whiteboard, as well as its application sharing, which allows the students to observe as the instructor uses a program.

An audioconferencing option starts at \$200; the purchase of the server is additional. The LearnLinc program runs on Windows NT Server 4.0, and it costs \$500 to \$1,000 per concurrent user, depending on the volume of licenses that are purchased.

—Michael Muchmore

APPLICATION DEVELOPMENT

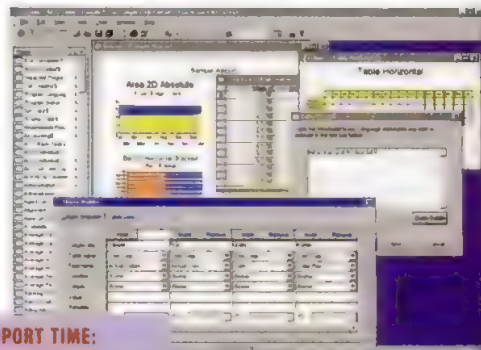
Tying It All Together

Pulling together a report can be a challenge, especially if all of your data isn't at a single central location. Positive Support Reviews aims to solve this problem with (310-453-6100, www.zinnote.com) **Zinnote 5.6**, a point-and-click management tool that allows users to generate customized reports, graphs, and charts from source data in multiple databases or across platforms.

Zinnote can map data from any ODBC-compliant data source, including desktop databases such as Access, Excel, FoxPro, Oracle, Paradox, and more. Graphical and tabular reports generated by Zinnote can either be printed out or placed directly on an intranet or the Internet. Zinnote costs \$749 for a single user; a 5-user pack is priced at \$2,795.

New in this version is a sched-

uling module that automatically updates reports and charts and exports these reports to HTML or Microsoft Word. This way, current financial information can be made available to managers within seconds. There's also sup-



REPORT TIME:
Graphs, charts, and data all come together with Zinnote.

port for summarizing data by month and year for easier trend analysis. According to the company, the latest release, which should be available by the time you read this, is up to ten times faster than the previous version, depending upon the user's network. Zinnote is compatible with Microsoft Windows 95, 98, and NT.—Emily Cohen

WEB AUDIO

California Streamin'

CD-ROMs in laptops may be more prevalent and affordable these days, but bringing music with you on the road isn't always convenient. If you find yourself

hard disk, so you can leave your CDs at home. The software lets you program a playback order from the song files, and it can retrieve album and song information from the CDDb service (www.cddb.com). **CD Streamer** works by initially reading digital audio information from your CDs, compressing that information using RealAudio technology, and then encrypting it. The utility can achieve a 94

percent audio data compression rate, enough to store a 4-minute song in about 2.5MB of hard disk space. CD Streamer files cannot be played anywhere except on the PC where they were created.

—Jeremy A. Kaplan



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REMOTE ACCESS

Tunnel the Web with VPN

Want a cost-effective way to connect remote users and branch offices? Virtual Private Networks (VPNs) let you make a virtual IP "tunnel" through the Internet that creates a secure network connection using proprietary tunneling protocols or open standards such as IPSec. That security comes from encryption such as DES and Triple DES. Once connected, you can use remote resources as you would locally.

VPNs offer an inexpensive and convenient means to connect mobile users (*dial-in*) and branch offices (*point-to-point*) because after the initial purchase price, the only charges you're likely to entail are the connection costs to your local ISP. They also provide an easy and secure way to create an extranet, which allows outside partners to have access to part of your network.

Although there are many different types of VPNs, they are generally broken into two camps: hardware and software. The hardware devices are self-contained boxes that provide all of the components and software necessary to run a VPN service. The software products are cheaper, but they need to run on separate, dedicated servers. In this issue's Net Tools section, we test seven hardware and software VPN solutions. Here, we look at several new products for small- to mid-size businesses that did not make it into our

roundup and which can handle both dial-in and point-to-point VPNs.

Toshiba America's (888-422-6677, www.toshiba.com) first VPN solution is **CryptoGate VPN** (\$1,295 list for server and 25 seats). CryptoGate is an IPSec software VPN that provides both DES and Triple DES encryption. CryptoGate has three parts. The Server runs on Solaris or Windows NT and delivers security service and processing. The Manager software installs on the same systems and lets the administrator control the VPN settings and provide centralized management. Any Windows 95 or NT Workstation PC with the Client software can use the server to create a tunnel back to the network.

Corralling Desktops

Traditional network setups leave you vulnerable to certain security and maintenance issues. Users can copy valuable company data to a floppy disk; there's the ever-present possibility of damage to PC components; and when a PC goes down, your IT people have to go to it to fix the problem. Thin clients have been one solution, but deploying them has additional costs, the server becomes a single point of failure, and most users prefer to have full PC capabilities. Innovative Network Technologies (512-266-8115, www.intlabs.com) offers another way with **Remote Desktop** (\$395 list).

Remote Desktop lets users get the full functionality of a PC while you keep the machine itself safe in a central network room. The kit includes two small boxes with four ports for peripheral connections. You attach the monitor, keyboard, and mouse connections of the PC to one box and the actual devices to the other. The benefit is that you can connect the devices with up to 1,200 feet of Category 3 or 5 cable, letting you keep the PCs in a central room and the desktop peripherals wherever you need them—and giving users the full PC experience. A new version available later this year will add support for speakers.—MNR



Assured Digital (978-486-0555, www.assured-digital.com) offers a family of hardware VPN products that scales from the server on up. The **ADI-500** (\$995 list) is a PCI server card that acts as the VPN switch and lets you make the server avail-



able over the Internet to extranet partners or remote users. The **ADI-1000** (\$1,295 list) connects user desktops to VPNs, and its integrated router lets you dynamically create up to four VPN tunnels at once, using two 10-Mbps Ethernet ports to connect to the network. All

ADI products are managed from the ADI Management System (AMS). The AMS runs on an Windows NT server and can control any ADI components on your network, as well as set policies and user rights; the ADI-100 client software runs on any Windows 95 PC or laptop.

Compatible Systems (800-356-0283, www.compatible.com) also offers a family of hardware solutions based on the IPSec tunneling method. The **IntraPort 2** (\$3,995 list) includes a 175-Mhz RISC processor to speed processing, software-based DES encryption, two 10/100 Ethernet ports to connect

to the network, and support for 64 remote client sessions or 16 point-to-point connections. The **IntraPort 2+** (\$9,995 list) adds a Triple DES encryption co-processor and support for 200 remote clients sessions or 32 LAN-to-LAN connections. The IntraPorts can use Windows 95 and 98, Windows NT Mac, and

Linux clients; the boxes are managed through the CompatiView GUI Manager running on Windows 95 or NT or can plug into SNMP-capable network management products.

Radguard (201-828-9611, www.radguard.com) offers the new **ciPro** (\$5,950 list), which combines VPN and firewall functionality in a single hardware box. This IPSec device claims to provide secure data throughput as high as 100 Mbps using random encryption keys for high-performance data transfer. The ciPro has two auto-sensing 10/100 Ethernet ports to connect to the network and can be placed within corporate networks—protecting LAN segments from other areas as well as delivering secure communication between LAN segments locally or over the Internet. The GUI management platform runs on Windows 95, 98, or NT.

VPNnet's (888-876-3888, www.vpnet.com) small-business hardware solutions have recently been enhanced with new management software. The **VSU-10** (\$2,795 list) is an IPSec-compliant box that can handle up to 100 simultaneous clients at 10Mbps encrypted transmissions. Connecting with two 10Mbps Ethernet ports, the unit can provide Triple DES encryption. It ships with the new VPNware System 2.5 software. The new client software fully supports Windows 98 as well as 95 and NT. On the administration side, 2.5 introduces new capabilities, which automatically updates remote users with new configuration and policy changes each time they log on.—Michael N. Rusignuolo

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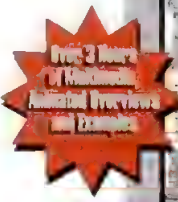
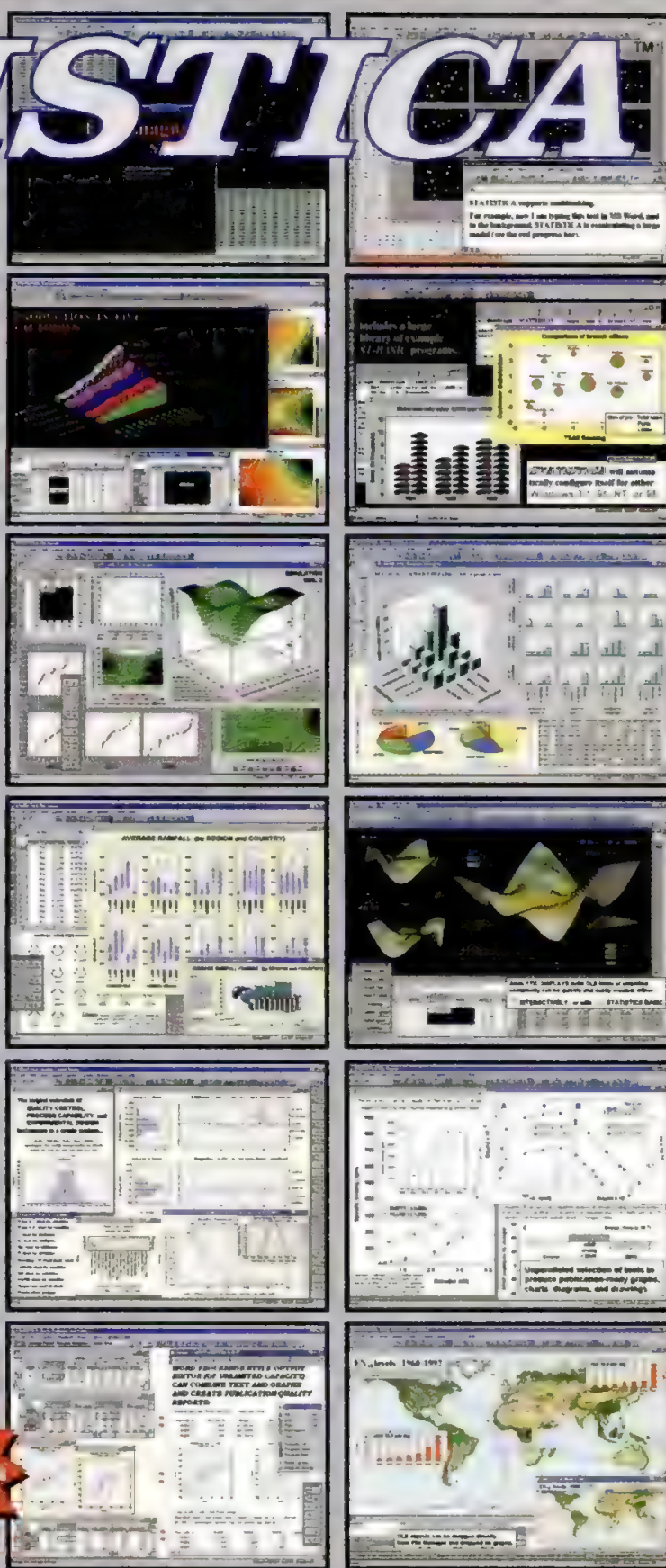
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First Looks



Lightweight Projection

These four new sub-10-pound LCD projectors are great personal projection tools, letting you take your show on the road without breaking your back.

By Alfred Poor

Even though most LCD projectors are less expensive, lighter, brighter, and easier to use than the CRT-based projectors they replaced, they still weigh in at 15 to 25 pounds, which is too heavy to be truly portable. Advances in micro-panel displays, lamp technology, and optics have made lighter weight projectors not just possible, but competitive with larger models.

The display industry calls these devices *ultraportables*, and tipping the scales at less than 10 pounds, many weigh no more than a full-featured multimedia notebook. As a result, people are discovering that these projectors make ideal personal presentation tools that they can take anywhere.

In our August roundup of LCD projectors ("Portable Projectors,"), we saw a number of portables, including the 6.8-

pound In Focus LP420 that shared Editors' Choice honors with the Epson PowerLite 7300. Since that story, quite a few new lightweight projectors that promise to advance this market segment have been announced.

A DYNAMIC MARKET

The fact that ultraportables are the fastest-growing portion of the projector market is one reason why manufacturers are giving this sector so much attention. According to Pacific Media Associates, these lightweights accounted for just 37,200 of the 334,400 projectors sold worldwide during 1997, or about 11 percent of the total.

This year, unit sales of ultraportables are projected to soar to 124,500 units, which is 31 percent of the 405,000 units sold. And next year, they are expected to grow to 208,300 units, or 42 percent of the projected

496,000 total unit sales.

We found four brand-new projectors to compare in this roundup. The Epson PowerLite 5500C and the Proxima Ultra-Light LS1 are both LCD-based designs, and the Davis DLX650 uses the Texas Instruments Digital Light Processing (DLP) micromirror display chip. We also included the new In Focus LP425. This new variation of the LP420 manages to wring more light out of almost the same components.

Two other projectors announced last summer would have qualified for this roundup but were not available. The Sharp Notevision4 was still not shipping in time for testing. The Sony VPL-SC50U was shipping, and some dealers apparently had units in stock, but Sony declined to make one available for us to review.

The Davis, Epson, In Focus, and Proxima units present some

INSIDE

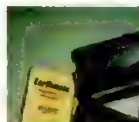
MULTIFUNCTION:

Take a look at the new Sony Digital Mavica MVC-FD81, which captures both XGA images as well as video clips directly to standard floppy disks. *Page 48.*



ROAD TRIP!

We look at GPS devices and travel and mapping software to help get you where you're going—and enjoy yourself along the way. *Page 52.*



USE YOUR WORDS:

L&H Voice Xpress Professional puts your voice in command and control over virtually any of your Windows applications. *Page 64.*



More Products Reviewed

Adobe ImageStyler 1.0	58
Microsoft PhotoDraw 2000	58
DVD-ROM, CD-R, and CD-RW drives	60
Nikon Super Coolscan 2000	64
Microsoft Cordless PC Phone System and Microsoft Digital Sound System 80	68
PhotoSuite II	73
LapLink Professional 2.0	73
Online Merchant	76
Corex CardScan Executive	76

First Looks Online

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First Looks

attractive choices and a variety of features. All are small enough to travel comfortably as carry-on luggage, bright enough that you can use them with the room lights on, and light enough that you won't have to spend a month in the gym to bulk up for your next road trip.

Davis North America

Davis DLX650

The Davis DLX650 projector is one of two in this group based on DLP micromirror technology but is the first pro-



jector in its weight class to offer native XGA resolution. This high resolution comes at a top price, however: The 9.9-pound unit carries a street price of \$7,500.

This system is ready to travel—from the dual-compartment soft-sided case (which also will hold your notebook PC) to the documentation that comes in printed form (as well as on a CD-ROM). You'll also find a simple remote control with a puck for remote mouse control and a copy of the Davis Presentation Tools software.

Setup is easy, using a convenient junction box that places graphics, audio, and mouse connectors near your computer. There are four adjustable feet to make precise adjustments and manual zoom and focus controls to help you size the image to fit the situation. There's even a Quick Menu of on-screen controls that you can call up with the remote to change the most commonly used adjustments, including brightness, contrast, and

sound levels.

On our tests, the single-speaker sound system had good tonal range and sufficient volume to fill a small room. Video signals produced excellent images, with good skin tones and no obvious scaling or motion artifacts. On our measured tests, the DLX650 produced 559 lumens, which is not far off the manufacturer's 650 ANSI lumen rating.

A high Contrast Ratio score can be expected with a DLP projector, but the Davis projector got the highest score of this group, at 213:1 (and even surpassed the top score from our August roundup). The Brightness Variance score was unimpressive, in spite of the unit's optics by Carl Zeiss. Screen illumination, however, appeared

to be fairly uniform.

The projector managed to create rock-steady images, and only the most demanding test images showed slight signs of pixel jitter. Colors were good, and scaling up SVGA images resulted in legible displays with no loss of information.

The DLX650 has some other attractive features—such as four preset color-adjustment settings. Its 120-watt UHP lamp is rated for a lengthy 2,000-plus hours of use. Also, for an additional \$200 (list), you can outfit this unit with an internal TV tuner.

There are just a few things about this Davis projector that could stand improvement. The remote control has an automatic picture-adjustment button that is too easy to press by accident; if you have tweaked the image, losing all those settings with a slip of the thumb is annoying. Also, it was not possible to adjust the contrast setting to display the lightest shades of gray, which can lead to the loss of detail in highlights of images.

There's a lot to like about the Davis DLX650, and none of its few flaws are fatal. The price may be the highest of the group, but it is a small premium to pay for XGA resolution. Most people will do fine with an SVGA projector, but if your particular needs require XGA, this is the first ultraportable that will do the job.

Epson America

Epson PowerLite 5500C



Look at your thumbnail. Each of the 0.9-inch polysilicon active-matrix LCD panels in the Epson PowerLite 5500C (\$7,500 street) is about that size. Three of these tiny SVGA panels combine to create bright and beautiful images from this 9.4-pound package, our Editors' Choice in this roundup.

Unlike most projectors that have a foldaway carrying handle, the Epson has a strap attached to one side—almost as an afterthought. The lens cap is tethered to the case, making it difficult to lose. And the projector comes with a soft-sided carrying case and remote control as standard features.

The included remote features mouse control. Serial support is available as part of an optional package that also lets you adjust the projector from your PC. The remote has a series of custom-effect buttons, which you can use to project pointers, highlight lines, and draw lines and boxes on-screen, independent of the image that's being projected.

Compared with a laser pointer in the hands of a presenter who's had one cup of coffee too many, these highlighting effects can be a much less distracting way of adding emphasis to an image. The 5500C also has color-temperature adjustments and a feature

Davis DLX650

Street price: \$7,500

Davis North America, San Jose,

CA; 888-798-9998

www.davisna.com

418 at www.pcmag.com/infocenter

PERFORMANCE TESTS

LCD Projectors



The lumens measurement—the total amount of light that reaches the screen—gauges the brightness of each unit (higher scores are better). Our test procedure sets the images to display a broader range of color shades than the ANSI test protocol, which is one reason that our scores tend to be lower than manufacturers' ratings.

The Contrast Ratio indicates the difference between white and black in the image (higher scores are better). The Brightness Variance indicates the difference between the brightest and dimmest measured points on the screen when projecting an all-white image (lower scores are better; 1.00 is a perfect score).

To create the test images used in this evaluation, we used Sonera Technologies' Displaymate (www.displaymate.com).

▲ High scores are best.			
▼ Low scores are best.			
Bold type denotes first place.			
■ denotes Editors' Choice			
	Lumens ▲	Contrast Ratio ▲	Brightness Variance ▼
Davis DLX650	559	213:1	1.63
■ Epson PowerLite 5500C	652	134:1	1.10
In Focus LP425	662	163:1	2.34
Proxima UltraLight LS1	360	44:1	1.33



Epson PowerLite 5500C

Street price: \$7,500

Epson America Inc., Torrance,
CA; 800-463-7766

www.epson.com

419 at www.pcmag.com/infolink

that lets you add any image (your logo, for example) to the projector's default blank screen.

The brightest part of the story, however, is the images that this projector creates. We measured 652 lumens (which is right on the money with the company's 650 ANSI lumen rating) produced by the projector's 120-watt UHE (ultra-high efficiency) 2,000-hour-rated lamp; this score would have placed the unit fourth in our August roundup. The 5500C's Brightness Variance was an astounding 1.10—the best of this group and good enough for a third-place tie in last summer's group. The Contrast Ratio score was less impressive at 134:1.

There are few items to criticize with the 5500C. The rear legs have screw adjustments, but the adjustable front ramp is difficult to set with precision, even using both hands. The throw distance of the lens is a bit long, even with the manual zoom, which could be a limitation in cramped conditions. There was some noticeable horizontal streaking on high-contrast images, and the stereo speakers had adequate volume but limited tone adjustment.

In general, however, the Epson PowerLite 5500C

does the best job of the bunch we reviewed here at delivering what you need in an ultraportable projector: bright, high-quality images in a lightweight package. In a field that rewards the brightest as the best, this is a winner.

In Focus Systems Inc.

In Focus LP425

A technical innovation helped In Focus engineers transform its LP420 into the brighter LP425 (\$6,000 street). The result is an increased rating from 500 to 700 ANSI lumens in the same 6.8-pound package.

The DLP engine used in the In Focus LP420 that shared Editors' Choice honors in August used the standard three-color wheel to illuminate the TI micromirror chip. To make a white image, the red, green, and blue lights were combined. The designers realized that adding a fourth, white segment to the color wheel would allow the chip to be bathed in white light directly from the lamp, resulting in a free boost to brightness.

On our tests, the LP425 edged out the Epson unit for the top score, at 662 lumens (though this is slightly below the 700 ANSI lumen rating). The DLP engine helped deliver an impressive 183:1 Contrast Ratio score, but the Brightness Variance score was disappointing at 2.34,

In Focus LP425

Street price: \$6,000

In Focus Systems Inc.,
Wilsonville, OR; 800-294-6400

www.infocus.com

420 at www.pcmag.com/infolink

Editors' Choice

• Epson PowerLite 5500C



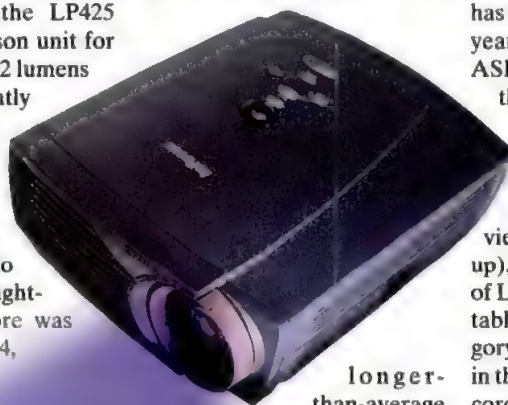
The two most important features in a portable projector are

weight and brightness. The Epson PowerLite 5500C packs a lot of light into a 9.4-pound package. And compared with the other bright light in the pack, the In Focus LP425, the Epson unit has many more features. This ban-tanweight projector is even brighter than most conference room models, giving a heavy-weight punch to your presentations.

which means that the brightest measured point on the screen was more than twice as bright as the dimmest. And this difference is clearly visible on the screen.

The scores and the image quality were good, but the missing items are the points that detract most from the projector. The unit comes with a soft-sided carrying case, but the projector itself has no handle. There is no remote included, though In Focus offers remote-control options that range in price from \$99 to \$356 (list).

There is no zoom feature on the lens, and the optics have a



longer-than-average throw, so you have to place the projector farther from the screen than the others in this group. There is only one adjustable leg. The projector has many

louvered cooling vents, which put out significant amounts of stray heat, light, and sound—especially out the front of the unit. This can be annoying to you and your audience and can detract from the image quality.

The In Focus LP420 projector was the best in breed earlier this year but is now an indication of how fast this market is moving: The same unit made brighter is now an also-ran

just six months later.

Proxima Corp.

Proxima UltraLight LS1

The Proxima UltraLight LS1 is the company's second product in the ultraportable market. The LCD-based projector carries a street price of \$6,000 and weighs in at a totable 8.4 pounds. But in spite of some other attractive features, its image quality is not up to par with its competitors.

Proxima was one of the early players in the LCD projection panel market, but the company has been struggling in recent years. Acquired last year by ASK ASA, Proxima is back in the running with an expanded product line and a rejuvenated development program. On the strength of its DLP-based DS1 (reviewed in our August roundup), Proxima has surged ahead of Lightware, which helped establish the sub-10-pound category, to take over second place in the ultraportable market, according to Pacific Media Associates. (In Focus remains solidly in first place.)

There are a lot of reasons to like the LS1. Unlike the plastic housings used with other projectors, this unit is encased in a

First Looks

durable yet light magnesium alloy, painted an attractive dark jade. The lens assembly is recessed in the front of the case, safe from inadvertent knocks.

The optics have powered zoom and focus. (The LS1 is the only system of the four in this round-up to offer this feature.) The full-function remote has a joystick instead of a puck for mouse control and even includes a laser pointer.

The soft-sided carrying case has space for a notebook. The projector includes a rugged fold-away handle on the side,

and a pair of adjustable legs in the front make precise adjustments fairly simple. Setup is easy, and the projector comes with a wide assortment of cables. The auto-adjustment feature for setting up the image was nearly flawless, making signal sync and image size and position adjustments automatically; they could not be im-

proved by manual tweaking. And projected video images looked great, with no scaling artifacts and good flesh tones.

All of this sounds impressive, but for the most part, these factors are all secondary to the most important detail: image quality with computer images. And this is where the LS1 stumbles. The projector uses three 0.9-inch polysilicon LCD panels with the images combined to create a single image. Unfortunately, the images were not precisely converged horizontally, so there was a noticeable red halo around white-on-black content on the right half of the screen. In addition, the image was not evenly focused; when the center of the image was in sharp focus, the corners were noticeably blurred.

On our mea-

surement tests, the amount of light projected with an all-"black" image was noticeable, even with the room lights on. Coupled with a lower brightness score than the others (360 lumens, rated at 600 ANSI lumens), this resulted in a disappointing Contrast Ratio of 44:1. The sole bright spot in the test scores was the Brightness Variance score, which was an impressive 1.33.

There are other minor issues, such as the lack of tone control for the single speaker. Sound is also distorted when set at maximum volume level (which still is not all that loud).

The LS1 is an acceptable projector, but the standards set by the competition for image quality are higher. You can do better with one of the other systems reviewed here. **PC**



Proxima Ultralight LS1

Street price: \$6,000

Proxima Corp., San Diego;

800-447-7692

www.proxima.com

421 at www.pcmag.com/infolink

DIGITAL CAMERAS

Movies and Stills

The Sony Digital Mavica MVC-FD81 uses floppy disks to store XGA images or MPEG-1 video and audio.

By Bruce Brown

Sony Electronics slams a home run with its Digital Mavica MVC-FD81 (\$899 list). Combining the ability to capture still images and MPEG-1 video on a standard 3.5-inch floppy disk, Sony hits the center of the electronics/PC/consumer/business market with the fat, sweet part of the bat.

The MVC-FD81 is based on a 0.25-inch 850KB progressive scan CCD with 3X optical zoom, intelligent flash, automatic shutter control (speeds from 1/60 to 1/4000 seconds), and a 2.5-inch color LCD viewfinder. Like its predecessor, the new Mavica has four special-effects modes, six lighting modes, and an intelligent lithium-ion battery good for recording 40 minutes of video or 650 still images.

At 23 ounces with its battery, the 5.6- by 4.1- by 2.5-inch

(HWD) Mavica is hefty for a digital camera but still small for a video recorder. There's no optical viewfinder, but the LCD performs this task with amazing clarity, thanks to the bright backlighting.

A single 1.44MB floppy disk holds 15 seconds of 320- by 240-resolution video (suitable for presentations) or 60 seconds of 160 by 112 video (better for e-mail), both with audio. Depending on image and compression modes, you can store up to 16 1,024- by 768-resolution images or up to 40 640- by 480-resolution images. You can also mix still-image and video capture on a single disk.

Without compression, only one image fits on a single floppy, in either format. Using the

camera's memory, you can copy a full disk's contents to another disk without using a computer.

If you briefly press the shutter button in video mode, a 5-second video is automatically recorded; hold the button longer and it continues to record until released. The flash and image-quality modes don't apply to video mode, but the re-

manually adjust the focus, image quality, and flash mode. With the 3X zooming, subjects can be as close as 10 inches in telephoto mode or 0.5-inch in wide-angle mode. Full 1,024- by 768-resolution images with normal compression had realistic color and very good detail, though not the same detail level as megapixel camera images. XGA resolution images and MPEG-1 video don't top the spec charts, but that doesn't matter with this camera.

The Sony Digital Mavica MVC-FD81's ability to take photos and make movies and store them on floppy disk is a technical accomplishment that will attract many home and business users.

Sony Digital Mavica MVC-FD81. List price: \$899. Requires: 8MB RAM, 38MB hard disk space, Microsoft Windows 3.1 or later or NT 3.51 or later. Sony Electronics Inc., Park Ridge, NJ; 800-222-7669; www.sony.com; 422 at www.pcmag.com/infolink.



sultant video clips are still fine for family use and have many business applications, such as real estate walk-throughs or short demos.

In still-image mode you can



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2 In early October 1998, PC World Magazine ranks the Micron Millennia the #1 Power Desktop on the market calling it "the fastest of all" systems tested.

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RAM	32MB SDRAM	64MB 100MHz SDRAM	64MB 100MHz SDRAM	64MB 100MHz SDRAM	128MB 100MHz SDRAM
Hard Drive	4.3GB Ultra ATA hard drive*	10GB Ultra ATA hard drive*	10GB Ultra ATA hard drive*	10GB Ultra ATA hard drive*	14.4GB 7200 RPM Ultra ATA hard drive*
Monitor	15" Micron 500Vx monitor (13.8" display)	17" Micron 700Vx monitor (15.9" display)	17" Micron 700Vx monitor (15.9" display)	17" Micron 700Vx monitor (15.9" display)	19" Micron 900Lx monitor (18" display)
DVD/CD-ROM	32X max speed CD-ROM drive	32X max speed CD-ROM drive	32X max speed CD-ROM drive	32X max speed CD-ROM drive	24X max speed CD-ROM drive and DVD-ROM drive and double cast***
Modem	3Com/U.S. Robotics 56K WinModem**	3Com/U.S. Robotics 56K WinModem**	3Com/U.S. Robotics 56K WinModem**	3Com/U.S. Robotics 56K WinModem**	3Com/U.S. Robotics 56K WinModem**
Graphics	nVidia Riva 128, 4MB SDRAM 3D AGP graphics	nVidia Riva 128, 4MB SDRAM 3D AGP graphics	nVidia Riva 128, 4MB SDRAM 3D AGP graphics	nVidia Riva 128, 4MB SDRAM 3D AGP graphics	Real 3D Starfighter T400, 8MB AGP graphics
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Warranty	5-year/3-year Micron Power™ limited warranty	5-year/3-year Micron Power limited warranty	5-year/3-year Micron Power limited warranty	5-year/3-year Micron Power limited warranty	5-year/3-year Micron Power limited warranty
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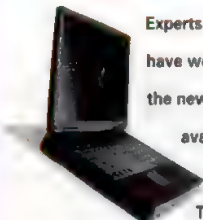
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—PC World, Ranked #1,
"Best Buy," April '98

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Clients Don't Come To You

11

VOL. 1 SEC. 02
98.11

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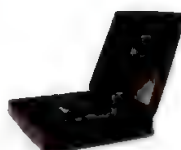
The world is a book,
and those who do not
travel, read only a page.
—William Goins, III



TREK² 233



TREK² 233



TREK² 266



New!

TREK² 300

Model Name	TREK² 233	TREK² 233	TREK² 266	TREK² 300
Processor	Intel® Pentium® II processor 233MHz	Intel Pentium II processor 233MHz	Intel Pentium II processor 266MHz	Intel Pentium II processor 300MHz
Cache	512KB L2 pipeline burst cache	512KB L2 pipeline burst cache	512KB L2 pipeline burst cache	512KB L2 pipeline burst cache
RAM	32MB SDRAM	64MB SDRAM	64MB SDRAM	64MB SDRAM
Hard Drive	3.2GB hard drive*	3.2GB hard drive (removable)*	3.2GB hard drive (removable)*	3.2GB hard drive (removable)*
Monitor	12.1" SVGA TFT display	14.1" XGA TFT display	14.1" XGA TFT display	14.1" XGA TFT display
Extra Storage	3.5" floppy disk drive	3.5" floppy disk drive (dedicated bay)	3.5" floppy disk drive (dedicated bay)	3.5" floppy disk drive (dedicated bay)
CD-ROM	24X CD-ROM drive	24X CD-ROM drive (dedicated bay)	24X CD-ROM drive (dedicated bay)	24X CD-ROM drive (dedicated bay)
Graphics	4MB AGP graphics accelerator	4MB AGP graphics accelerator	4MB AGP graphics accelerator	4MB AGP graphics accelerator
Sound System	Built-in stereo speakers & microphone	Built-in stereo speakers & microphone	Built-in stereo speakers & microphone	Built-in stereo speakers & microphone
Warranty	5-year/1-year Micron limited warranty	5-year/1-year Micron limited warranty	5-year/1-year Micron limited warranty	5-year/1-year Micron limited warranty
Software Included	Microsoft® Windows® 98 System Wizard Mobile Client™ Norton AntiVirus	Microsoft Windows 98 Microsoft Office Small Business Edition System Wizard Mobile Client™ Norton AntiVirus	Microsoft Windows 98 Microsoft Office Small Business Edition System Wizard Mobile Client™ Norton AntiVirus	Microsoft Windows 98 Microsoft Office Small Business Edition System Wizard Mobile Client™ Norton AntiVirus
Also Includes:	Zoomed Video capable Li-Ion battery (dedicated bay) Microphone, stereo line-in/out jacks Touchpad pointing device CardBus ready S-Video & NTSC out; MPEG compatible WaveTable/3D Positional Sound 2-way fast infrared port 2 Type II/1 Type III PCMCIA slots 2-USB, parallel, serial, VGA, PS/2 ports	Zoomed Video capable Li-Ion battery (dedicated bay) Microphone, stereo line-in/out jacks Touchpad pointing device CardBus ready S-Video & NTSC out; MPEG compatible WaveTable/3D Positional Sound 2-way fast infrared port 2 Type II/1 Type III PCMCIA slots 2-USB, parallel, serial, VGA, PS/2 ports	Zoomed Video capable Li-Ion battery (dedicated bay) Microphone, stereo line-in/out jacks Touchpad pointing device CardBus ready S-Video & NTSC out; MPEG compatible WaveTable/3D Positional Sound 2-way fast infrared port 2 Type II/1 Type III PCMCIA slots 2-USB, parallel, serial, VGA, PS/2 ports	Zoomed Video capable Li-Ion battery (dedicated bay) Microphone, stereo line-in/out jacks Touchpad pointing device CardBus ready S-Video & NTSC out; MPEG compatible WaveTable/3D Positional Sound 2-way fast infrared port 2 Type II/1 Type III PCMCIA slots 2-USB, parallel, serial, VGA, PS/2 ports

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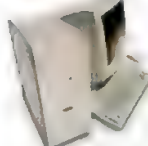
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OBSOLESCENCE PROTECTION

3. Other computer companies make you wait 2 to 4 years in their upgrade programs before you can trade up, and many hold you to restrictive finance agreements. With Micron you're eligible to upgrade a system anytime from 12 to 48 months after purchase, regardless of how you finance your purchase. Plus, you can send us your old machines for wholesale trade-in rebates which apply towards the purchase of new machines.

CUSTOM CONFIGURATION

4. Some manufacturers force you to purchase pre-selected software packages to qualify for their programs. Not Micron. We offer unparalleled hardware and software flexibility with all our custom-configured machines.

MICRON ANNOUNCES BREAKTHROUGH PRICING ON AWARD-WINNING SYSTEMS

Model Name	Millennia® C300	Millennia 350	Millennia 400	New! Millennia 450	New! Millennia 450 MAX
Processor	Intel® Celeron® processor 300MHz	Intel Pentium® III processor 350MHz	Intel Pentium III processor 400MHz	Intel Pentium III processor 450MHz	Intel Pentium III processor 450MHz
Cache	128KB Internal L2 cache	512KB Internal L2 cache	512KB Internal L2 cache	512KB Internal L2 cache	512KB Internal L2 cache
RAM	32MB SDRAM	64MB 100MHz SDRAM	64MB 100MHz SDRAM	64MB 100MHz SDRAM	128MB 100MHz SDRAM
Hard Drive	4.3GB Ultra ATA hard drive*	10GB Ultra ATA hard drive*	10GB Ultra ATA hard drive*	10GB Ultra ATA hard drive*	14.4GB 7200 RPM Ultra ATA hard drive*
Monitor	15" Micron 700Hz monitor (13.8" display)	17" Micron 700Hz monitor (15.9" display)	17" Micron 700Hz monitor (15.9" display)	17" Micron 700Hz monitor (15.9" display)	19" Micron 900Hz monitor (18" display)
DVD/CD-ROM	32X max speed CD-ROM drive	32X max speed CD-ROM drive	32X max speed CD-ROM drive	32X max speed CD-ROM drive	DVD-ROM drive and decoder card***
Modem	3Com/U.S. Robotics 56K WinModem**	3Com/U.S. Robotics 56K WinModem**	3Com/U.S. Robotics 56K WinModem**	3Com/U.S. Robotics 56K WinModem**	3Com/U.S. Robotics 56K WinModem**
Graphics	nVidia Riva 128, 4MB SDRAM 3D AGP graphics	nVidia Riva 128, 8MB SDRAM 3D AGP graphics	nVidia Riva 128, 8MB SDRAM 3D AGP graphics	nVidia Riva 128, 8MB SDRAM 3D AGP graphics	Road 3D Starfighter 740, 8MB AGP graphics
Sound System	PCI 64-voice WaveTable sound	PCI 64-voice WaveTable sound	PCI 64-voice WaveTable sound	PCI 64-voice WaveTable sound	PCI 64-voice WaveTable sound
Warranty	5-year/3-year Micron Power Unlimited warranty	5-year/3-year Micron Power Unlimited warranty	5-year/3-year Micron Power Unlimited warranty	5-year/3-year Micron Power Unlimited warranty	5-year/3-year Micron Power Unlimited warranty

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Replace your desktop with the Micron TransPort TREK

Model Name	TREK™ 266	New! TREK™ 300	GoBook™ 233	GoBook™ 266	New! GoBook™ 300
Processor	Intel Pentium II processor 266MHz	Intel Pentium II processor 300MHz	Intel Pentium processor with MMX™ technology 233MHz	Intel Pentium II processor 266MHz	Intel Pentium II processor 300MHz
Cache	512KB L2 pipeline burst cache	512KB L2 pipeline burst cache	512KB L2 pipeline burst cache	512KB L2 pipeline burst cache	512KB L2 pipeline burst cache
RAM	64MB SDRAM	64MB SDRAM	64MB EDO RAM	32MB EDO RAM	32MB EDO SDRAM
Hard Drive	3.2GB hard disk drive (removable)*	3.2GB hard disk drive (removable)*	2.1GB hard drive*	3.2GB hard disk drive*	3.2GB hard disk drive (removable)*
Monitor	14.1" VGA TFT display	14.1" VGA TFT display	12.1" SVGA TFT display	12.1" SVGA TFT display	12.1" SVGA TFT display
DVD/CD-ROM	24X CD-ROM (dedicated bay)	24X CD-ROM (dedicated bay)	24X modular CD-ROM drive	24X modular CD-ROM	24X CD-ROM (dedicated bay)
Graphics	4MB AGP graphics accelerator	4MB AGP graphics accelerator	2MB/128-bit graphics accelerator	2MB/128-bit graphics accelerator	2MB/128-bit graphics accelerator
Sound System	Built-in stereo speakers & microphone	Built-in stereo speakers & microphone	16-bit stereo/WaveTable sound	16-bit stereo/WaveTable sound	16-bit stereo/WaveTable sound
Warranty	5-year/1-year Micron limited warranty	5-year/1-year Micron limited warranty	5-year/1-year Micron limited warranty	5-year/1-year Micron limited warranty	5-year/1-year Micron limited warranty
Upgrades	128MB SDRAM for \$180	128MB SDRAM for \$180	Add SuperBatt battery for \$200	Add SuperBatt battery for \$200	Add SuperBatt battery for \$200

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TRAVEL SOFTWARE

Upgraded street atlases, trip planners, and GPS units help you to stay on track when you're traveling.

By Bruce Brown

There's an incredible amount of value in trip planning and mapping software for family and business travelers. Sales volumes and competition keep prices low, even as the amount of information provided—and interesting and helpful ways to use it—continues to increase. These five new atlas and trip planning titles feature better data and search features, and most have interfaces with 3Com Palm and Windows CE hand-held devices, GPS readers, and the Internet.

**ROAD TRIPS
DOOR-TO-DOOR
1989**

TravRoute's entry, Road Trips Door-to-Door 1999 (\$50 street), adds new features and data to the program's fast mapping and address-to-address routing capabilities. With Internet connectivity, the ability to download directions to PDAs, and significantly increased points-of-interest information, Door-to-Door 1999 is a great value for business and leisure travelers.

As in previous versions, when you type in stops on your trip, they are automatically matched to place names in Door-to-Door 1999's database. After you calculate a trip, a mini-atlas of local area maps for each stop is created. In addition to accommodation information, you can search by interstate highway exits for ATMs, rest rooms, hospitals, shopping, RV services, and other information to plan stops or for quick access while traveling. Calculated route directions (but not maps) can be downloaded to

3Com or Windows CE devices.

Door-to-Door 1999's Geo-Browser is a powerful feature for use with an Internet connection. Point to any underlined place on a map to access online information about restaurants, hotels, and other points of interest. You can also access local weather and road construction updates.

You can download contact or

The program looks and runs like the previous versions but has added features such as a Via function for specifying preferred route segments and intersection location searching. More exit services data is provided, with information such as the availability of car washes, store and restaurant types, and places to buy diesel fuel.

Street Atlas USA includes address-to-address routing and helps you find information about locations simply by browsing; extensive local attraction and service information is available. Other features include demographic data, radio station information, and voice navigation (when used with a GPS receiver).

You can search for locations by address, zip code,

35MB hard disk space, Microsoft Windows 95, 98, or NT. Delorme, Yarmouth, ME; 800-452-5931, 207-846-7000; www.delorme.com; 402 at www.pcmag.com/infolink.

STREETFINDER DELUXE 1989 EDITION

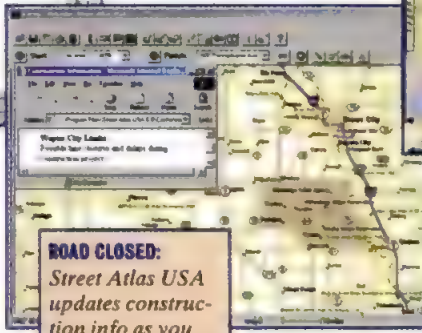
Business travelers will find great value in Rand McNally's Street-Finder Deluxe 1999 Edition (\$50 street). The program can find street addresses in the 48 contiguous states and Hawaii, using two CD-ROM disks. Extensive hotel, restaurant, and attraction

FOUR STAR: *Street-Finder's Concierge* incorporates the listings of the *Mobile Travel Guide*.

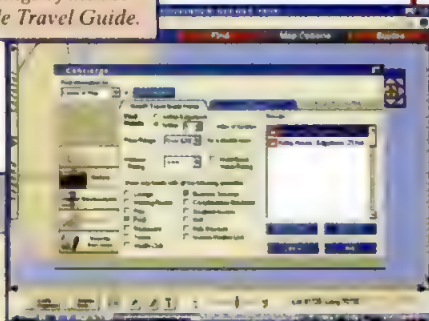


PIT STOP: Click on any underlined location in Door-to-Door 99 and access local information.

location data
from ACT!,
Goldmine.



ROAD CLOSED:
Street Atlas USA
updates construc-
tion info as you
move around.



information is included, and with an Internet connection, you can calculate address-to-address routing.

StreetFinder is the only program that has the Trip Organizer feature set which, in addition to letting you incorporate online travel reservations with trip plans, also keeps a detailed expense report. A MoneyMinder with tips for economical travel is also included.

StreetFinder helps you to find locations based on address, place names, or yellow pages-style listings. The Concierge feature provides location-specific city information, night life, business and service information, plus the searchable Mobile Travel Guide.

You can connect a GPS to find your current location or to track your travel progress; directions can be downloaded to your PDA. An address book in StreetFinder lets you download and save customer, contact, and location information, as well as label specific-

STREET ATLAS USA 6.0

Delorme's latest version of Street Atlas USA (\$45 street) has been updated with 600,000 new or improved street data items and 9-1-1 street name data, plus it has more connectivity with hand-held PCs.

place names, and by latitude and longitude. Contact manager and database geo-coded information can be downloaded and integrated into Street Atlas USA maps. With the included Delorme Solus Basic application you can download a map or route directions to a 3Com Palm or Windows CE device.

Street Atlas USA has strong Internet connectivity, including regional construction and weather updates, which work automatically after you register the software. The program can update constantly as you move around maps (a fast Internet connection helps).

Street Atlas USA 6.0. Street price: \$45. Requires: 8MB RAM.

First Looks

ic locations on area maps.

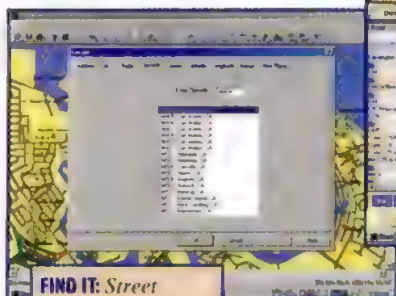
StreetFinder Deluxe 1999 Edition. Street price: \$50. Requires: 8MB RAM, 65MB hard disk space, Microsoft Windows 95, 98, or NT. Rand McNally New Media, Skokie, IL; 800-333-0136, 847-329-6576; www.randmcnally.com; 403 at www.pcmag.com/infolink.

STREET WIZARD 6.0

Adept Computer Solutions' Street Wizard 6.0 combines a trip planner with address-to-address trip routing and a U.S. street atlas. At \$74.95 (list), Street Wizard is the most expensive product here, yet it doesn't include Internet links or direct GPS linking (although you can use GPS data to find locations). Street Wizard produces attractive maps with many drawing and customization features and has a variety of search methods.

More appropriate for business users, Street Wizard lets you use information from many contact managers or database files to

plot locations and label maps. Contact managers supported include direct links with ACT!, GoldMine, REA, and On-Schedule, but the program also can use text-format



FIND IT: Street Wizard 6.0 provides a wide variety of tools to find locations.

databases from a wide range of applications.

An efficient feature is the ability to select and save a specific map area to your PC's hard disk. Map segments can also be downloaded for use with an included Windows CE 2.0 application for display on both H/PC and palm-size PCs.

The program lacks links to Internet updating, but Street Wizard 6.0's interaction with contact managers and database programs makes it a powerful tool.

Street Wizard 6.0. List price: \$74.95. Requires: 8MB RAM, 20MB hard disk space, Mi-

sive advanced routing wizard, analyzes routes based on your preferences and can access online construction and closed road information.

TripMaker 1999 includes the online Mobil Travel Guide, searchable exit service data, and the ability to make online airline, hotel, and car rental reservations,

which can be incorporated into trip itineraries. This version comes with GPS support as well as Parents' Corner, which provides information about traveling with children. There's also a MoneyMinder feature that lets you search for accommodations by price category, connect to online money-saving travel tips, and track expenses.

TripMaker Deluxe 1999 Edition. Street price: \$50. Requires: 8MB RAM, 25MB hard disk space, Microsoft Windows 95, 98, NT. Rand McNally New Media, Skokie, IL; 800-333-0136, 847-329-6576; www.randmcnally.com; 403 at www.pcmag.com/infolink.

crosoft Windows 3.1, 95, 98, or NT. Adept Computer Solutions Inc., San Diego; 800-578-6277, 619-597-1776; www.streetwizard.com; 404 at www.pcmag.com/infolink.

TRIPMAKER DELUXE 1999 EDITION

TripMaker Deluxe 1999 Edition (\$50 street) is Rand McNally's entry for leisure travelers. This year's update includes weekend getaway and short trip suggestions and the ability to download directions to 3Com and Windows CE hand-held devices. RoadSense, the impres-

Location, Location, Location

Even the best routes and maps won't help if you have no idea where you are. A variety of new 12-channel GPS devices can pinpoint your location with accuracy within 100 meters.

Delorme's **Earthmate** (\$160 street, bundled with Street Atlas USA 6.0), is lighter at 5.4 ounces than the company's earlier 9.2-ounce TripMate model and is more compact at 0.6 by 2.8 by 4.5-inches (HWD). The Earthmate must be attached to a PC, 3Com Palm hand-held, or Windows CE device via a serial cable (it has no screen of its own). (Delorme, Yarmouth, ME; 800-452-5931; www.delorme.com; 402 at www.pcmag.com/infolink.)

Garmin's **StreetPilot GPS** (\$550 street) mounts on an automobile dashboard. The device has basic maps of the entire United States, which are displayed—along with your current location—on a generous 4.3-inch diagonal, bright backlit screen. Street-level detail maps with local points of interest are available on metropolitan area-specific cartridges (\$99 to \$199 list). StreetPilot calculates routes based on stops you enter, or they can be downloaded from Delorme travel software. (Garmin International, Olathe, KS; 800-800-1020; www.garmin.com; 416 at

www.pcmag.com/infolink.)

Magellan's **Map 'N Tracker** (\$330 street, with \$30 rebate) is a full and flexible package that includes a hand-held GPS, an updated version of the company's Map 'N Track street atlas with route calculation added, a PC data cable with a 12-volt power adapter, and batteries. The GPS can be used independently of a PC for outdoor sports or just to keep track of where you are as you walk around a city. (Magellan Corp., San Dimas, CA; 800-669-4477; www.magellangps.com; 417 at www.pcmag.com/infolink.)

Version 2.0 of TravRoute's **Door-to-Door CoPilot** (\$200 street)

is intended for use in a vehicle while being attached to a laptop. The GPS receiver sits on the dashboard and connects to the PC via serial cable and receives power from the car via a cigarette lighter adapter. In addition to an enhanced GPS unit and updated street and address data, CoPilot's data now includes exit services and points of interest. (TravRoute, Princeton, NJ; 888-872-8768; www.travroute.com; 401 at www.pcmag.com/infolink.)





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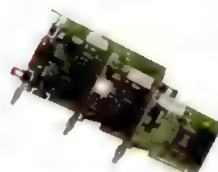
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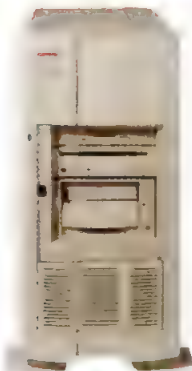
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First Looks

GRAPHICS SOFTWARE

Graphics for the Masses

Microsoft PhotoDraw 2000 is the easiest way we've seen to create professional-looking business graphics.

By Edward Mendelson

With PhotoDraw 2000 (\$149 list), Microsoft muscled its way into the business graphics market with a photo-editing and drawing package that may knock competitors aside. PhotoDraw is designed for users with no graphics expertise but who want to create expert-quality graphics for presentations, logos, flyers, cards, Web sites or special effects for digital images. PhotoDraw's vector (line drawing) and bit-map (photo and paint) features are combined seamlessly. Users can create new images using preset tools like photo brushes that draw lines in the shape of hoses, chains, and alligators. Or the program can build an image

based on any of 300 templates.

The superbly lucid interface consists of a main work area surrounded by optional toolbars, some of them floating. A large toolbar leads to main functions like drawing, color, and special effects; each toolbar opens a drop-down menu with tiny images that indicate what each tool does. A gallery of textures, lines, colors, shadows, 3-D, and other effects offers clear explanations and groups-related features, like color and transparency.

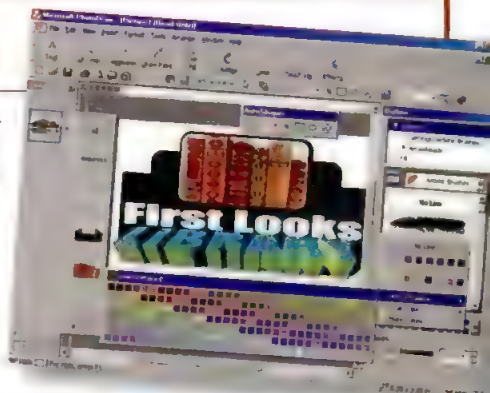
Unlimited Undo makes experimenting easy, and PhotoDraw—unlike Adobe's PhotoDeluxe—works easily with multiple images. Open images appear in a column of thumbnails; an arrow next to each opens a thumbnail

list of its layers (individual elements), and a layer can be dragged through the list to move it forward or back in the image. Or the layer can be dragged to a different image.

PhotoDraw shares some code—and some annoyances—with Microsoft Office. Files can't be renamed or deleted from nonstandard dialogs like the Visual Open box that displays thumbnails of image files.

Some third-party graphics import filters were not adequately tested; a few of our test WPG graphics were imported with their colors inverted. You can add files to Microsoft's 2,000-image clip-art library, but you can't modify the built-in gallery of 375 textures and other effects.

The soft-edged, slightly fussy-looking templates aren't as stylish as the ones in Microsoft Pub-



LIKELY: PhotoDraw's related settings like color palette and line style are in the same dialog box.

lisher, but they're better than anything most business users can design on their own. Those who want high-quality graphics with minimal effort should put PhotoDraw at the top of their buying list.

Microsoft PhotoDraw 2000. List price: \$149. Requires: 32MB RAM, 190MB hard disk space, Microsoft Windows 95 or NT 4.0 or later. Microsoft Corp., Redmond, WA; 800-426-9400; www.microsoft.com/office; 406 at www.pcmag.com/infolink.

WEB GRAPHICS SOFTWARE

Fast Online Effects

Adobe's ImageStyler provides tools for design-deficient business users to create impressive Web graphics.

By Luisa Simone

The latest entry into the booming Web graphics market is Adobe ImageStyler 1.0 (\$130 street). Targeted at business users, the software offers a collection of formatting tools, visual effects, and image optimization techniques.

ImageStyler emphasizes formatting over drawing or painting functions. It provides only four geometric shapes and a library of approximately 100 vector outlines. If you want to create original artwork, you must resort to an external program.

ImageStyler's object-oriented approach gives you the power to change the appearance of a text, vector, or raster object by reversing or modifying its associated attributes. On the simplest level,

this means you can edit text or change the fill color of an object. On a more advanced level, you can remove a filter effect from an imported picture.

Time-pressed business users can get immediate gratification by applying one of the 100 predefined styles to an object. More adventurous (and experienced) users will want to roll their own styles.

ImageStyler productivity features include object aliases (where all instances of an object are updated when any one instance is changed) and batch updates of existing HTML documents (which replace specified text strings, such as H1 headings, with an ImageStyler graphic).

Batch updating is extremely



PALETTE-ABLE: ImageStyler's palettes let you choose styles, apply effects, and create JavaScript rollovers.

efficient and shields users from cutting and pasting HTML code. ImageStyler also gets a gold star for its approach to JavaScript rollovers. These animated interface elements are created using a task-specific palette that looks like the Object Layer palette but actually contains separate layers for each button state.

ImageStyler converts images to standard Web formats (GIF, JPEG, or PNG), produces client-side image maps, and slices large

images into HTML tables to improve download performance. But in many cases, these features don't match the power of other programs. For example, ImageStyler doesn't offer robust color reduction functions, nor does it let you choose different export options for each segment of a sliced image.

ImageStyler meets the needs of two user groups. Its predefined styles deliver ease of use to graphically challenged users, and its core formatting tools provide creative flexibility for those with more training.

Adobe ImageStyler 1.0. Street price: \$130. Requires: 32MB RAM, 40MB hard disk space, Microsoft Windows 95, 98, or NT 4.0 or later. Adobe Systems Inc., San Jose, CA; 800-888-6293, 408-536-6000; www.adobe.com; 405 at www.pcmag.com/infolink.



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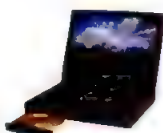
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First Looks

OPTICAL DISK DRIVES

Faster Access to Data

These three new optical drives follow up higher data capacities with faster access to that data.

By Alfred Poor

One constant in the computing industry is an insatiable appetite for increased data capacities and faster access to them. Optical disk technologies such as CD-ROM, CD-R, CD-RW, and DVD-ROM have addressed the capacity issue, but compared with hard disks, they can be exasperatingly slow.

Manufacturers have sought ways to speed up the performance of these drives, as demonstrated by the three new products we review here: The Sony DDU220E/H 5X DVD-ROM Drive, the Smart and Friendly CD Rocket, and the Sony CRX100E Spessa CD ReWritable. Each covers a different format, but their shared mission is to bring data to you faster.

As we've already seen with high-speed CD-ROM drives, the maximum data transfer rate is not always the rate you'll experience during normal use. Even so, these drives provide substantial improvements over their slower competitors.

SONY DDU220E/H 5X DVD-ROM DRIVE

The Sony DDU220E/H 5X DVD-ROM Drive (\$349 list) is a complete DVD package. The drive uses an enhanced IDE (ATAPI) interface and comes with the widely used REALmagic Hollywood Plus MPEG-2 decoder board from Sigma Designs. The bundle also includes two DVD-ROM titles: the Zork Grand Inquisitor adventure game and Funk & Wag-

nalls Encyclopedia.

Installation was fairly straightforward, though the drive must be installed as the master on either the primary or secondary IDE channel. Fortunately, the Quick Start

manual, which includes a decision tree diagram to help you configure the other IDE components you may already have installed, is excellent.

The real draw of this product is speed. A single-speed DVD drive provides 1,358-KBps transfer rates, which is the speed of the drive when playing a DVD movie disk. Pop in a DVD-ROM, however, and the drive is rated to transfer up to 6,740 KBps. This is still slower than a hard disk (fast hard disks are rated at about 20,000 KBps, or about three times as fast).

As with high-speed CD-ROM drives, however, the speed rating for the Sony DVD is variable and reaches the highest speed only at the outer tracks of a disk. On our tests, the drive started at a transfer rate of 3,119 KBps. The transfer rate increased steadily from that start, and by the end of the disk (which contained about 4GB of

data out of a possible 4.7GB total capacity), the rate had increased to 6,610 KBps.

Even at the slowest rate, however, the drive is significantly faster than single- or double-speed DVD-ROM drives. For CD-ROMs, the transfer rates varied from 740 KBps to 1,475 KBps, which is about 5 to 10 times the speed of a single-speed CD-ROM.

The REALmagic Hollywood card uses an analog overlay design, requiring a pass-through cable (included in the kit)

from your existing graphics adapter. The card does a good job with DVD movies, though there are better options.

If you intend to watch only movies with your DVD kit, then there are better upgrade choices on the market. But if you want the fastest access to

data on DVD-ROM disks, then the Sony DDU220

E/H 5X DVD-ROM Drive fills the bill—and gives you fast access to CD-ROM data in the bargain.

Sony DDU220E/H 5X DVD-ROM Drive. List price: \$349. Requires: 16MB RAM, 2MB hard disk space, Windows 95 or 98. Sony Electronics Inc., San Jose, CA; 800-352-7669; www.sony.com/storagebysony; 412 at www.pcmag.com/infolink.

SMART AND FRIENDLY CD ROCKET

If you want to work only with CDs but also want to record them as fast as possible, consider the new CD Rocket from Smart and Friendly (\$1,000 street). Rated at 1,200-KBps data transfer rate for writes, this drive sets a new speed standard for CD-R performance. For CD-ROM access, the data trans-

fer rate is 3,000 KBps.

The kit includes the drive, an Adaptec AVA-2902A PCI SCSI adapter, and a broad assortment of software for creating and editing audio and data CDs (as well as the standard edition of the handy Adaptec EZ-SCSI utilities). The kit also bundles a single blank CD-R that is certified for 8X-speed recording.

The Quick Start guide makes setup and configuration easy. Instead of the bundled SCSI card, we used an Adaptec AHA-2940 PCI SCSI adapter in our test system; you should expect similar performance from the bundled card.

The primary program in the bundle is NTI CD-Maker CD-mastering software. The software is straightforward and easy for novice users. For data use, you can simply drag and drop files from Windows Explorer to create a set of files to copy on the fly. The program has a test feature that will verify that your drive can write at 1X, 2X, 4X, and 8X speeds for both data and



DVD-ROM: The Sony 5X drive can access DVD-ROM data at up to 6,740 KBps.



CD-R: The CD Rocket sets a new speed standard for CD-R drives.

ing 340MB of data in a series of subdirectories, it took 7 minutes and 18 seconds, which included 1 minute and 53 seconds of data preparation time before the actual writing began. This is less than half the time required by any of the 4X CD-R drives that we tested in our roundup, "To Write or Rewrite?" (March 10, 1998).

As a CD-ROM drive, the Rocket CD still performs well. Rated at 20X (3,000 KBps), it too, has variable transfer rates. We measured 1,441 KBps at the inner tracks and 2,927 KBps at the end of a 577MB CD-ROM. This works out to a range of approximately 10X to 20X, which should give a boost to your CD-ROM data access.

Music enthusiasts will be pleased with the software bundle, which has some special features for audiophiles. The Sonic Foundry CD Architect and Sonic Foundry Sound Forge XP utilities provide sophisticated audio-editing tools. And Diamond Cut Audio Restoration Tools 32 are designed to create audio tracks from analog sources (such as vinyl records and cassette tapes) and automatically remove noise and enhance sound quality using digital filters.

So whether you're just in a hurry to move data onto CD-R, or if you have a music collection from the days of hot wax that you want to convert to cool polycarbonate, the Smart and Friendly CD Rocket is ready to handle the job quickly and easily. This speed comes at a steep price premium, however, so some users may find it worth the savings to wait a little longer for their CD-Rs to finish writing.

Smart and Friendly CD Rocket. Street price: \$1,000. Requires: 32MB RAM, 50MB hard disk space, Microsoft Windows 95, 98, or NT 4.0. Smart and Friendly Inc., Chatsworth, CA; 800-959-7001, 818-772-8001; www.smartandfriendly.com; 413 at www.pcmag.com/infolink.

PERFORMANCE TESTS

Optical Disk Drives



To gauge the performance of these three optical disk drives, we used a test that measures the amount of data being read from the disk and the speed at which it is read. The test reads data from the disk sequentially, measuring the transfer rate as it goes along. As is typical with optical drives (assuming a constant rotational speed), transfer rates are fastest

at the outermost tracks on the disk.

Because we did not use test disks that were completely filled with data, the maximum read rates that you see below are lower than manufacturers' claimed ratings. Manufacturers' ratings are calculated for disks with data all the way to the outer edge, where maximum transfer rates are achieved.

	DVD		CD-ROM		CD-R
	Minimum read (KBps) ▲	Maximum read (KBps) ▲	Minimum read (KBps) ▲	Maximum read (KBps) ▲	Record 340MB (minutes seconds) ▼
Sony DDU220E/H 5X DVD-ROM Drive	3,119 (2 3X)	6,610 (4 8X)	740 (4 9X)	1,475 (9 8X)	N/A
Smart and Friendly CD Rocket	N/A	N/A	1,441 (9 6X)	2,927 (19 5X)	7:18
Sony CRX100E Spressa CD ReWritable	N/A	N/A	1,625 (10 8X)	3,399 (22 7X)	13:16

N/A—Not applicable. The product could not perform this test.

SONY CRX100E SPRESSA CD REWRITABLE

One limitation of CD-R technology is that it's a write-once media—once something is recorded on the disk, it's there forever. If you'd like to be able to write CD-R disks, as well as CD-RW disks that let you delete files and write more, then consider the Sony CRX100E Spressa CD ReWritable (\$399 list). This EIDE drive is rated at 2X for CD-RW writing, 4X for CD-R writing, and 24X maximum for reading CD-ROM disks.

Installation is easy, and the package includes Sony CD Right! Software, which is perhaps the most accessible and nonintimidating software available for CD-R. You can create archive CDs by dragging and dropping files from Windows Explorer. The Spressa also has a number of features designed to make it easy to create audio CDs, including a way to create mixed CDs by adding tracks from different sources at the

same time. The package also includes software to create CD labels and jewel case inserts.

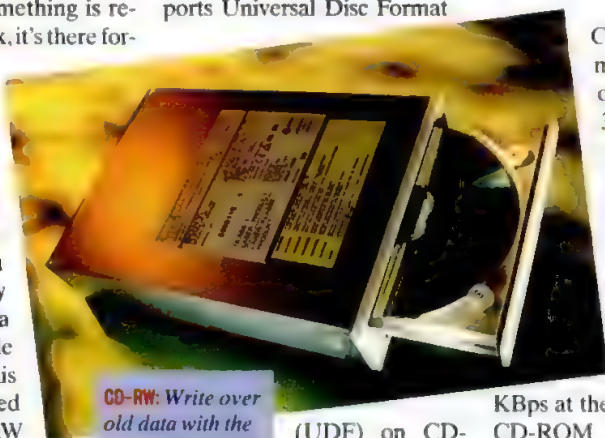
Sony also has a utility that supports Universal Disc Format

mance with the CD Rocket. As its rating would predict, it was not as fast on the CD-R writes but was faster for CD-ROM reads.

The 4X-rated Sony CD-RW drive took 13 minutes and 16 seconds to write the 340MB test data set to a CD-R, which is roughly twice as long as the 8X-rated CD Rocket. The CD-ROM access rates were variable, starting at 1,625 KBps and reaching 3,399

KBps at the end of the 577MB CD-ROM (which approaches the 3,600-KBps maximum transfer rating specified by Sony for the drive).

The Spressa includes a 1MB internal buffer to prevent interruptions in the data stream. The kit also includes one blank CD-R and one blank CD-RW, so you'll be ready to put your new drive to work right away. **Sony CRX100E Spressa CD ReWritable.** List price: \$399. Requires: 16MB RAM, Windows 95, 98, or NT 4.0. Sony Electronics Inc., San Jose, CA; 800-352-7669; www.sony.com/storagebysony; 414 at www.pcmag.com/infolink.



CD-RW: Write over old data with the Sony CRX100E Spressa CD ReWritable.

(UDF) on CD-RW media; Sony abCD lets you save and delete

files on CD-RW media with ease, including saving files directly from within other applications by assigning the drive a letter just like any other disk drive. The software wasn't ready in time to make it in the box with the first shipments of the drive, but Sony will send it free to users who return the registration card (along with other freebies including backup software, CD labels, and a CD label applicator).

We compared the Spressa's CD-ROM and CD-R perfor-

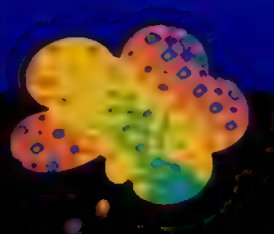
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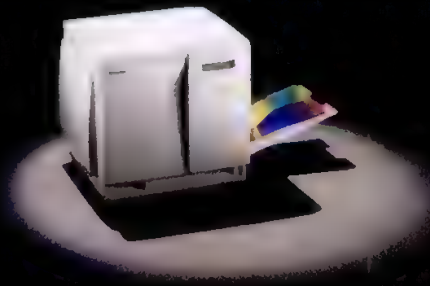
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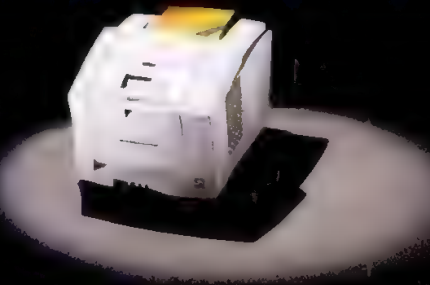
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First Looks

PERIPHERALS

Flawless Film Scanning

Nikon's Super Coolscan 35mm film scanner with Digital Ice technology produces stunning results.

By Daniel Grotta and Sally Wiener Grotta

Despite advances in digital cameras, film is still the medium of choice for serious photographers. Nikon's Super Coolscan 2000 (\$1,900 street) 35mm film scanner not only produces high-quality, high-resolution scans with dead-on accurate color, it can save countless hours by eliminating the need to retouch minor and major film defects.

The Super Coolscan's Color Management System uses ICC color profiles, and scanning can be done in RGB, sRGB, CMYK, HSL, or Lch (luminance chrominance hue) color space. You can also scan and save in 8- or 12-bit format. And the dynamic range has been boosted to 3.6, which is drum scanner territory.

For even higher image quality that boosts the optical dynamic range while it reduces noise, the device can oversample (repeat scanning each line) 4X to 16X. Performance has also increased dramatically—highest resolution scans that once took 15 minutes can now be done in just over 1.5 minutes.

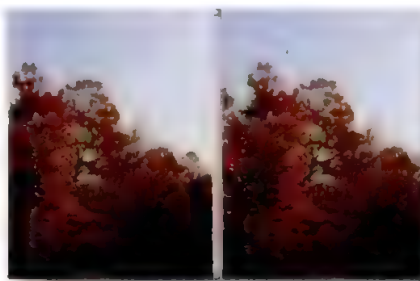
The most important refinement is the addition of Applied Science Fiction's Digital Ice technology. Through a combination of hardware and firmware, the Super Coolscan reads the red, blue, and green color layers in film emulsion and then also reads the protective surface layer. Any scratches, stains, or dust on the surface layer are simply subtracted from the final image.

There is a small price to pay for using Digital Ice's magic, however: It increases scan times 200 to 250 percent. It also slightly increases contrast while decreasing sharpness. For that reason, Nikon's interface has an

optional unsharpen filter.

Nikon's interface can be used as either a Twain driver or as a standalone scan program. Users can customize many preferences, such as performing auto-exposure and auto-focus before each preview or scan.

We would have liked the ability to input RGB numbers in addition to using sliders. You can check resolution and file size by opening one of the foldouts, but they aren't displayed when you're ready to scan. Nor does



CLEAN IT UP: Digital Ice technology (left) subtracts flaws such as dust or scratches.

the software estimate scan times.

The Super Coolscan is quiet, easy to use, and fast. When used as a Twain driver within Photoshop 5.0, it took an average of 30.2 seconds to scan a 35mm slide at 1,350 dpi to produce a 6.22MB file; to scan the same slide with Digital Ice enabled

took 75.3 seconds. A full-resolution scan (2,700 dpi), which produced a 24.9MB file, took 97.8 seconds; the same scan with Digital Ice took 270 seconds.

For top-quality film scanning, the Nikon Super Coolscan 2000 with Digital Ice technology is

the device to buy.

Nikon Super Coolscan 2000. Street price: \$1,900. Requires: 32MB RAM, 50MB hard disk space, Microsoft Windows 95, 98, or NT 4.0 or later. Nikon Inc., Melville, NY; 800-526-4566, 516-547-4315; www.nikonusa.com; 409 at www.pcmag.com/infolink.

SPEECH RECOGNITION

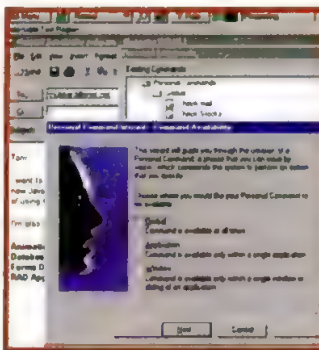
Hands-Free Navigation

With L&H Voice Xpress Professional, your voice can be your guide through the Windows desktop.

By Greg Alwang

Lernout & Hauspie is targeting business professionals and Microsoft Office users with its latest continuous-speech recognition offering, L&H Voice Xpress Professional Version 2.0 (\$150 street). Voice Xpress Pro

pecially in the areas of application support and speaker enrollment. Enrollment now covers commands, spelling, and correcting words in more depth, and the program uses this information to fine-tune the language model to attain a higher level of accuracy.



SPEAK EASY: The Personal Command Wizard lets you create command and text macros that can call other programs and enter text via simple voice activation.

supports dictation into virtually any Windows application and provides natural language command and control of Microsoft Excel, Word, PowerPoint, Outlook 98, and Internet Explorer.

Since Version 1.x, Voice Xpress Pro has improved markedly, es-

pecially in the areas of application support and speaker enrollment.

You can manually train and add words to the 30,000-word base vocabulary or use the Vocabulary Extender to import documents. In addition, Voice Xpress Pro supports downloadable Plug-In vocabularies for Business & Finance, Technology, In the News, and Leisure categories.

SmartText shortcuts let you insert blocks of text by voice, and the new Personal Command Wizard lets you create command macros. You can create a macro that starts your e-mail program and creates a new message simply by saying "create new message."

A new Talk and Go feature lets you record on a hand-held device and upload recordings to Voice Xpress. For network and mobile users, an Import/Export feature lets you transfer your profile to another computer so you can continue to update it. **L&H Voice Xpress Professional.** Street price: \$150. Requires: 48MB RAM (64MB for Windows NT), 130MB hard disk space, Microsoft Windows 95, 98, or NT 4.0. Lernout & Hauspie Speech Products USA Inc., Burlington, MA; 800-380-1234, 781-203-5000; www.lhs.com; 410 at www.pcmag.com/infolink.

In our informal comparison, we were able to achieve greater accuracy in less time with the new version.

Voice Xpress Pro now allows full Windows Desktop voice control, so you can simply say "open Notes" or "switch to

Word" to open and switch between programs. The MS Office natural language integration lets you work completely hands-free, issuing application-specific commands such as "insert a 3-by-5 table" in Word or "total this



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*Using optional 2nd battery in removable drive bay.
Shown above: the powerful functions of the PCG-818.

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First Looks

USB DEVICES

Put USB to Good Use

Two new devices from Microsoft—the Cordless PC Phone System and Digital Sound System 80—plug in to USB.

By Bruce Brown

More likely than not, that new PC sitting on your desk came equipped with USB ports. USB devices are becoming more and more common; the following are two new products to put that port to use.

MICROSOFT CORDLESS PC PHONE SYSTEM

A sophisticated call management system for home or home office use, the Microsoft Cordless PC Phone System (\$200 street) consists of a 900-MHz cordless, single-line analog phone with a cradle/charger station, a base station with antenna, and Microsoft Call Manager software.

The cordless handset operates independently from your PC, but with Call Manager running, the integrated system delivers voice mail, voice command, speed dialing, and Caller ID enhancements. (You need Caller ID to take advantage of many of the phone's features.)

The 40-channel analog phone has strong, clear reception within its range (roughly a square acre) but doesn't extend as far as 900-MHz digital or digital-spread spectrum phones. Another limitation is the nickel cadmium battery, which requires 10 hours to charge and is rated for only 8 hours of talk time and 5 days of standby. The phone also lacks an LCD, a common feature these days.

Microsoft Call Manager lets you make and receive calls hands free at the computer using your PC's microphone and speakers. The program has an address book for individuals and groups,

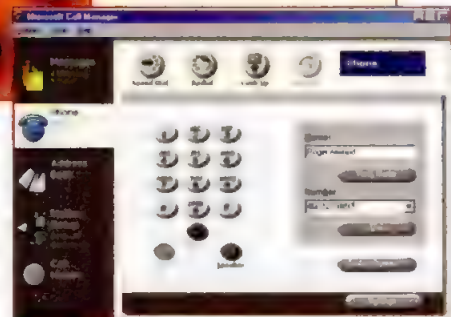
a call history file, and support for multiple, secured mailboxes, remote access, and message forwarding to pagers and cell phones. If you use Outlook Express, e-mail messages can be read to you remotely.

With Caller ID, you can set priority levels to allow or limit access for specified callers, and you can record private, personalized greetings. Caller ID announcements also flash on the computer screen.

Call Manager stores up to 40 contacts for speed dialing and voice command dialing from the handset. Several other handset voice commands are available for checking and navigating messages, with no voice recognition training required.

The Microsoft Cordless PC Phone System creatively combines

YOUR CALL: With Microsoft Call Manager, you can speed-dial a number, click on the keypad buttons, or type the number to initiate a call.

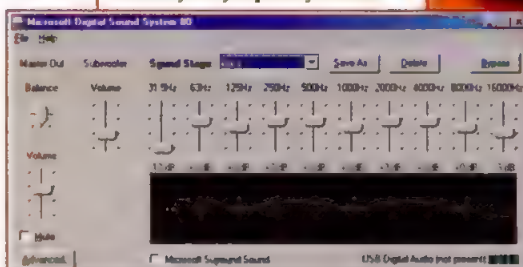


features of portable phones, Caller ID, voice mail, and PIMs. **Microsoft Cordless PC Phone System.** Street price: \$200. Requires: 16MB RAM, 30MB hard disk space, Microsoft Windows 95 or 98. 411 at www.pcmag.com/infolink.

MICROSOFT DIGITAL SOUND SYSTEM 80

If you're in the market for upgraded PC speakers, the Microsoft Digital Sound System 80 (\$250 street) is an appealing choice you can use with legacy PCs today and full digital PCs tomorrow. The DSS 80 works with any AV device with an audio output, but for greatest value and versatility, hook it up

TURN IT UP: The Microsoft Digital Sound System 80's Equalizer Control lets you adjust the relative volume for each of ten frequency bands.



to your PC with both analog and USB cables.

The DSS 80 consists of a 44-watt subwoofer with a 160-Hz to 40-Hz response range and two 16-watt, 60-Hz to 20-KHz, satellites. A digital amplifier mounted on the subwoofer has a DSP that can simulate 3-D sound or decode four-channel surround-sound digital content and uses Philips Electronics' wOOx subwoofer technology.

If you connect with both analog and USB digital cables, you'll be able to handle the full variety of current audio signals. For example, current DVD-ROM drives and many CD-ROM drives process analog content only through an audio card; with a USB connection only, you'd be out of luck. Note that the DSS 80 doesn't support digital audio output from any SCSI CD-ROM drive. If you'll only be lis-

tening to digital content, however, your PC doesn't even need an audio card.

Conveniently located buttons (but with hard-to-read black-on-black icons) on the right speaker control muting and



satellite and subwoofer volume. They are synchronized via USB with the software controls. When you push the speaker buttons,

the software representations move accordingly, though often with a time lag on our 166-MHz Pentium test system.

The sound quality of the speakers is very good. Digital audio content is particularly clear, but analog audio CDs also sound appealing, particularly with the simulated surround control clicked on. We overloaded the subwoofer by maxing all volume settings when we played a hard rock audio CD, but for most reasonable sound levels, the audio is right and tight.

The Microsoft Digital Sound System 80 leverages high-speed USB technology to bypass PC sound cards for quality digital audio processing, but it also work with analog sound sources. **Microsoft Digital Sound System 80.** Street price: \$250 (\$50 rebate). Requires: 16MB RAM, 2MB hard disk space, Microsoft Windows 98 (MS-DOS 5.0 or later or Windows 3.x or later for analog mode). Microsoft Corp., Redmond, WA; 800-426-9400; www.microsoft.com; 411 at www.pcmag.com/infolink.

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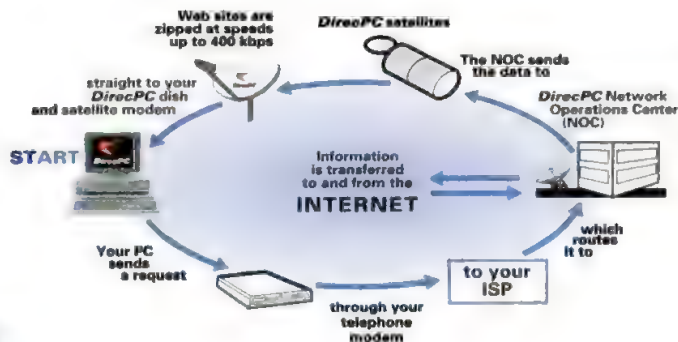
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can arrange professional installation for you, too. Either way, getting started is just a phone call or a mouse click away.

How does it work?

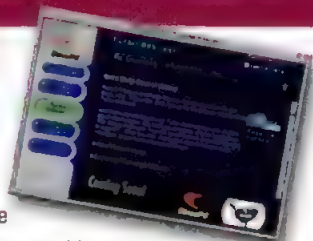
The engineers at Hughes figured out that the real bottleneck in the speed of the Internet wasn't the request **out** to the Web — telephone modems handle that just fine. Everything slows down when the Web tries to use the telephone system to send you **back** the media-rich information you requested. So, we use a much faster satellite connection for sending you the Web content you want. Check out the diagram — this is the system that makes DirecPC the fastest Internet access available nationwide.



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Additional Hourly Rate (Including ISP)	\$1.99/Hour	\$1.99/Hour	\$1.99/Hour
Additional Hourly Rate (Without ISP)	\$.99/Hour	\$.99/Hour	\$.99/Hour
DirecPC Services			
Turbo Webcast: Broadcast delivery of popular Websites to your PC's hard drive	Included	Included	Included
Turbo NewsCast: Broadcast delivery of up to 30,000 Usenet Newsgroups to your PC's hard drive	Included	Included	Included
Turbo Internet: Fully interactive access to the Internet at speeds up to 400Kbps	Included in Online Time	Included in Online Time	Included in Online Time
Free E-mail Accounts	1	1	4
Networking (Number of Seats)	N/A	N/A	4

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First Looks

REMOTE-CONTROL SOFTWARE

Access Your Office PC

The newest version of LapLink Professional provides USB cable support and Windows 98 optimization.

By Steve Rigney

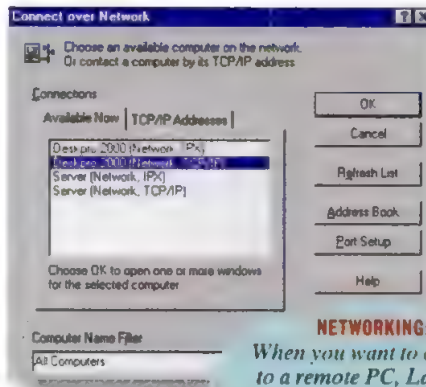
Traveling Software's LapLink Professional Version 2.0 (\$149 list) adds several new features, including USB cable support, remote bidirectional printing, and better cross-platform interoperability. Combined with the existing file transfer, remote control, and scheduling agent, it's an extremely powerful remote access application.

We found that this new version is still missing some important features, such as the ability to map drive letters to a remote hard disk. There's also no built-in security to protect individual remote files and subdirectories.

The ability to print to a remote printer is one of our favorite additions. With this new version, you can decide to print to your local printer or any printer on the remote host and the remote network.

To use the USB connection, you have to purchase a cable (\$39.99 list) from Traveling Software. With speeds of 4 to 6 Mbps, however, you may find the USB connection worthwhile.

The file transfer utility allows you to copy, move, and synchronize files and directories between two PCs. This new version of LapLink lets you use the sched-



NETWORKING:

When you want to connect to a remote PC, LapLink provides you with a choice of connection methods.

features round out the new benefits. Multiple monitor support built into Windows 98 can be used for a remote control session: Use one monitor to view your desktop and a second to control another PC remotely.

LapLink Professional 2.0 is not a major upgrade, but if you need to print to a remote printer or use Windows 98, we recommend it. Otherwise, stick with the version you're running.

LapLink Professional 2.0. List price: \$149. Requires: 16MB RAM, 10MB hard disk space, Microsoft Windows 3.1, 95, 98, NT 4.0, or CE 2.0. Traveling Software Inc., Bothell, WA; 800-343-8080, 425-483-8088; www.travsoft.com; 408 at www.pcmag.com/infolink.

IMAGE-EDITING SOFTWARE

Working with the Web

PhotoSuite II's new structure lets you seamlessly update its feature set over the Web.

By Daniel Grotta and Sally Wiener Grotta

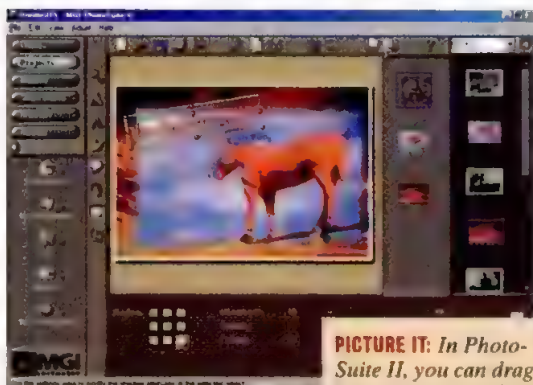
The only things MGI's PhotoSuite II has in common with its predecessor are its name and its large share of the consumer photo-imaging market. PhotoSuite II (\$50 street) is a completely new type of program and is one that may change the way software is marketed.

PhotoSuite II is fully integrated with the Internet, even to the point of having embedded Internet Explorer 4 code.

From within PhotoSuite, you can drag and drop pictures from online photo-processing services, stock agencies, or any Web page. Similarly, the pictures, slide shows, and Web pages you create in PhotoSuite can go out to the

Internet or through e-mail from within the program.

MGI has structured PhotoSuite II as a *Dynamic Client*, a



PICTURE IT: In PhotoSuite II, you can drag and drop images from anywhere on your PC or from the Internet.

new type of application. The embedded Internet Explorer DLLs let PhotoSuite users access MGI's Web page for application updates, new tools, special effects, content, and so on, all of which

are implemented automatically. Without a fast Internet connection, however, downloads can take 20 minutes or longer.

Just about all the tools one would expect in a consumer imaging program are available in PhotoSuite II, but not all of them are smoothly executed. For instance, the paintbrush tool is versatile, but resizing the brush requires clicking through the full range of possibilities. The brush cursor stays a crosshair, providing no information on what size swath it will paint until you apply the color.

PhotoSuite II has templates for creating posters, business cards, greeting cards, and calendars.

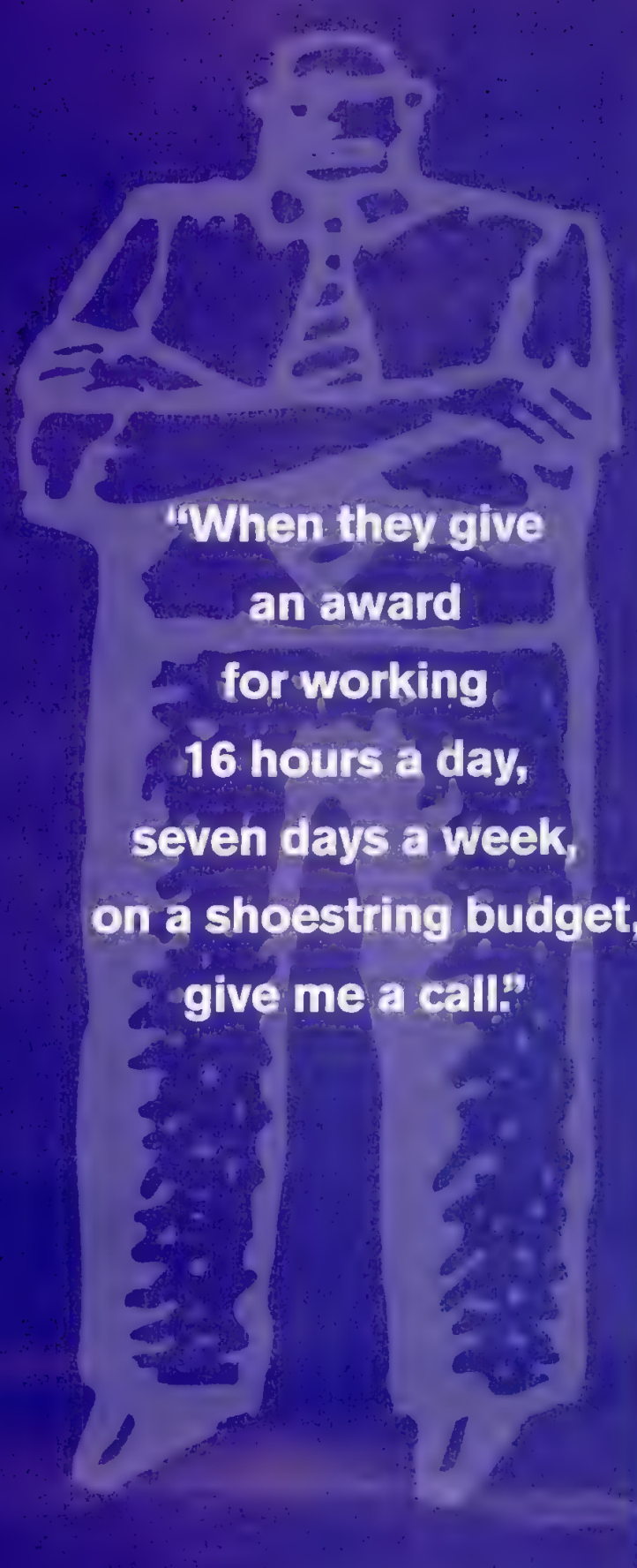
None of the current (and somewhat limited) templates is editable beyond the photos and text that the user adds.

The modular aspect of the ar-

chitecture segments the program's features, creating some workflow problems. Selection tools, for example, are available in the Photo Edit mode, where you can use them to restrict areas where paint or effects will be applied. Selections can be copied to the clipboard for pasting into other pictures, but you can't drag and drop another picture into them. What's more, selections can't be saved, nor do they remain active when you move into another mode.

In the Projects mode, you can drag and drop images as object layers into a composition, but you don't have selection tools for shaping or cropping them. Those layers disappear when you switch back to Photo Edit mode to apply special effects.

The Dynamic Client architecture is the big story with PhotoSuite II—not its tools or features. **PhotoSuite II.** Street price: \$50. Requires: 16MB RAM, 80MB hard disk space, Microsoft Windows 95, 98, or NT 4.0. MGI Software Corp., Toronto; 888-644-7638, 905-764-7000; www.mgisoft.com; 407 at www.pcmag.com/infolink.



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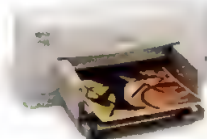
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First Looks

E-COMMERCE SOFTWARE

For Sale on the Web

Alpha Software's Online Merchant includes all you need to set up your own store on the Web.

By Jim Lynch

Profitable Web sites must have three main components: content, community, and commerce. Getting the last one right can sometimes be a difficult and frustrating chore.

Online Merchant (\$99 list) offers a wide range of commerce elements to add to your site, letting you open your own store on the Internet. You can create a customized interface; set payment, tax, and shipping options; create a catalog for your product line; and preview your store before you publish it online.

To test the software, we used it to create our own store. We began by following the menus presented at start-up and entering our store information, in-

cluding our address, our phone number, and all the other information necessary for customers to contact us. We were pleased to see that Online Merchant also had fields for metatags, making it easier for search engines to find our store.

Online Merchant comes with a wide range of predesigned site graphics and templates. If you choose, you can skip the templates and add your own graphics to customize your store completely. We opted for the predesigned templates, adding our logo to the original graphics.

Online Merchant's menus

made it easy to set discount options, payment mechanisms, and even a wrapping-paper option for gift purchases. We chose to allow payment by credit card, submitted electronically. Online



WHAT'S IN STORE: Online Merchant offers a range of preview options so you can check out your store before publishing it.

Merchant Professional (\$495 list) allows integration with Open Market's Transact technology and with CyberCash.

The next step was to choose categories and products and create product lines. We followed the tabbed menus and made our

choices, adding descriptions and other information. We also chose the button graphics to associate with our categories, lines, and products.

After these steps, we then proceeded to publish our store. You'll need to enter your server URL and the other information necessary to upload your store. Online Merchant lets you preview your store before publishing it. We were able to view our main storefront, category, product, index, cart, and order screens with the click of a button for each.

If you'd like to get your feet wet with Internet commerce, Online Merchant is worth a look. It might be your first step on the road to online riches.

Online Merchant. List price: \$99. Requires: 16MB RAM, 7MB hard disk space, Microsoft Windows 95, 98, or NT 4.0. Alpha Software, Burlington, MA; 800-451-1018, 781-229-2924; www.onlinemerchant.com. 400 at www.pcmag.com/infolink.

PERIPHERALS

Scan and Synchronize

Corex's CardScan Executive improves business card scanning and synchronizes with more PIMs.

By Bruce Brown

Have you ever returned from a conference with a batch of business cards, having every intention of adding them to your PIM, only to find them in your desk drawer six months later? The Corex CardScan Executive (\$270 street) is a handy solution to this common problem. The package includes the CardScan 300 scanner and CardScan Version 4.0 software, which supports editing and organizing scanned information and synchronizes with PDAs, hand-held PCs running Windows CE 2.0, and popular PIM programs.

The CardScan 300 connects to your PC as a parallel port pass-through device (a cable is included). At 2.7 by 6.4 by 5.75 inches (HWD), the unit needs little

desk space but is too bulky for mobile use. Because the scanner is easy to install and network compatible, it makes sense to share one within a workgroup.

Standard-size business cards slide easily through the scanner at 400-dpi resolution; oversized cards don't work well or at all. A batch feeder would be a welcome enhancement, as would a batch counter in the software to ensure all cards were scanned successfully.

We scanned a random batch of 100 business cards in about 20 minutes: 80 percent had no errors or needed one correction, 15 percent required two to four corrections, and 5 percent had four or more errors. The clean-up process took about an hour. These are impressive results con-

sidering the test batch's variety of card fonts, languages, layouts, logos, photographs, and styles.

Once your cards are scanned and processed, CardScan's application provides many useful features for organizing and using contact information. You can

view the original card as it was scanned; categorize contacts; add notes; view lists of contacts by category, company, or name; search on word strings; print card information on labels or lists; and move information between CardScan files and other applications.

You can click on an e-mail address, phone number, or URL to initiate a call, send an e-mail, or visit a Web site. You can also address faxes in WinFax Pro and FaxWorks Pro by clicking on a fax number.

Three two-way synchroniza-

tion programs are provided with the package: Microsoft's ActiveSync technology for Windows CE 2.0 devices; Puma Technology's IntelliSync for many popular PIMs; and a conduit for 3Com's Palm, and IBM's WorkPad devices.

Scanning accuracy is its most notable strength, but CardScan Executive offers much more: its own communication links, editing software, and extensive capabilities to synchronize with other products.

Corex CardScan Executive. Street price: \$270. Requires: 16MB RAM, 13MB hard disk space, Microsoft Windows 95, 98, or NT 4.0 or later. Corex Technologies Corp., Cambridge, MA; 877-227-3722, 617-492-4200; www.cardscan.com; 415 at www.pcmag.com/infolink





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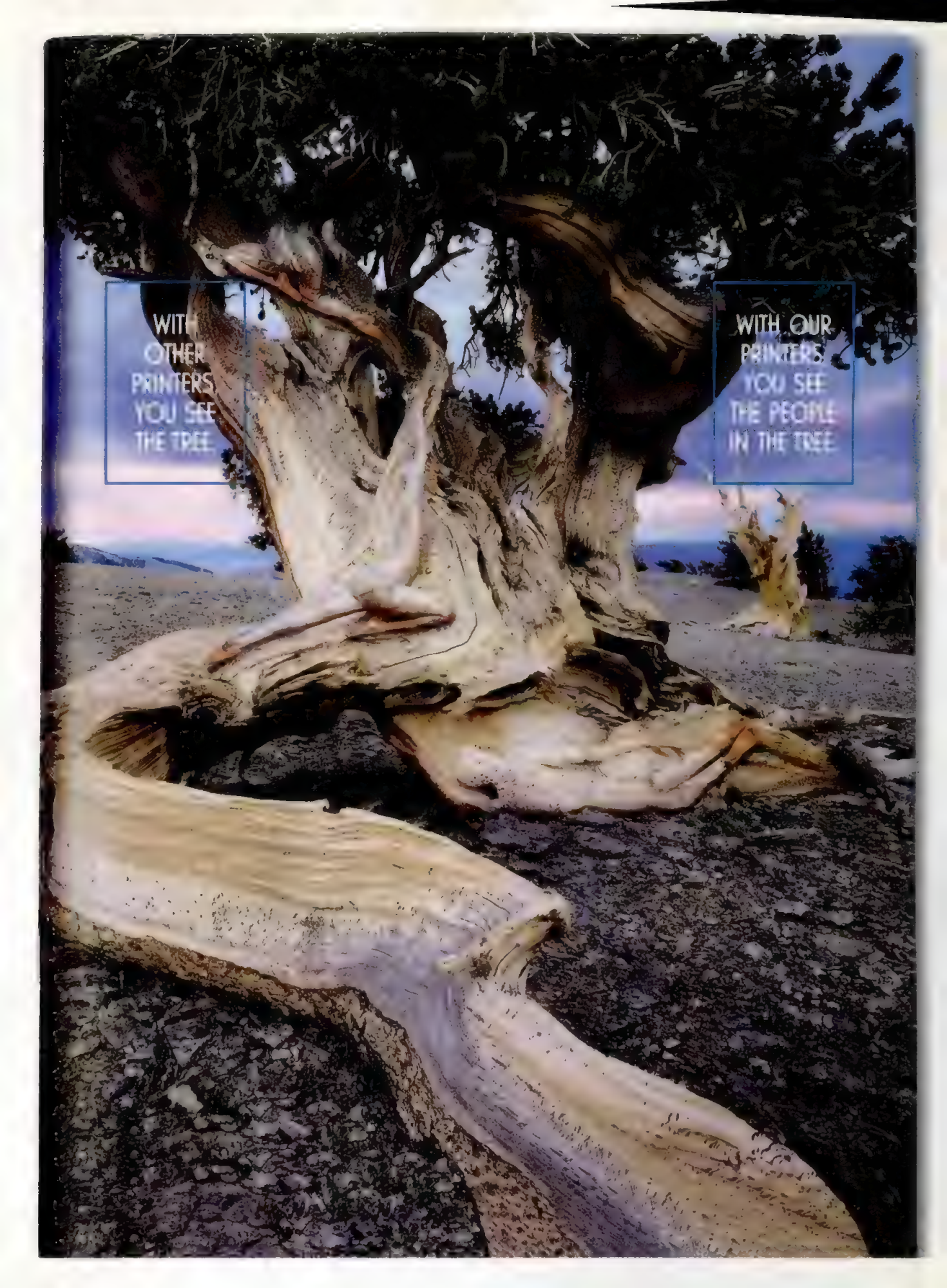
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Second Looks

ONLINE COMMUNITIES

Towers of Babble?

By Jim Lynch

Online communities have been around in one form or another since the dawn of the Internet. These communities have enabled people of similar interests to form groups and connect with one another regardless of geography and time constraints.

Before the advent of the Web, most online communities existed as e-mail lists, newsgroups, bulletin boards, chat rooms, and forums on various proprietary online services. People found value in these communities: They provided a way to meet other people of similar interests and backgrounds, to debate issues and concerns, and to gather information on just about any topic under the sun.

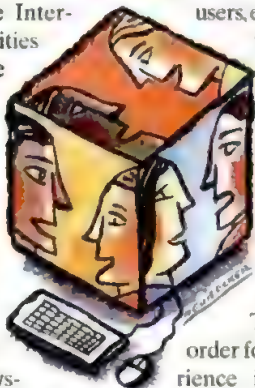
Once the Web took off, online communities began filtering on to Web sites. Although the technology left much to be desired, community added another dimension to Web sites—namely, interaction. Online communities were supposed to help lead sites into profitability by retaining audiences and promoting user loyalty to sites.

Unfortunately, we've seen many companies and organizations put up bulletin boards and chat rooms only to see them either completely empty or strewn with profanity and porn-laden exchanges between users. The idea that one can simply add a chat room and message board and then immediately have a community hasn't worked in many cases.

Building successful and compelling communities involves more than just putting up mes-

sage boards and chat rooms. It requires tight integration with static content (for Web sites), the ability to reach a critical mass of users, experienced moderation and community leadership, technology that facilitates communication among the users, and a sense of how delicate and organic an online community can really be.

This can be a tall order for sites with no experience in the community game or without the traffic to hit a critical mass of users. Investing in community technology, staff, and promotion can put a big dent in content budgets, with few guarantees of a real payoff. So given some of these problems, do any successful online communities exist now in the days of the Web? Well, yes, but the forms and shapes of some of these communities are radically different in some ways from those of the past.



Online communities are still viable; in fact, they're thriving. They are adapting and changing, moving beyond where they were before. New technologies and new contextual concepts are letting more people become part of online communities and, more important, use them to enhance

their work and their lives.

As bandwidth availability increases and PCs get stronger, no doubt we'll also see more multimedia elements creep into online communities. Video and audio already have footholds, and it won't be long before both become part of routine online interaction.

IOMEGA ZIP DRIVE

Still the Removable Standard

By Edward Mendelson

The Iomega Zip Drive remains king of the hill among removable drives, and even the widely reported troubles with a small number of Zip Drives probably won't dethrone it in the near future. Every Windows PC needs a large-volume removable disk drive in addition to a 1.44MB floppy disk drive, a CD-ROM drive, and a hard disk. The Zip Drive's 100MB capacity, fast transfer rates, relatively low price, and wide availability have made it the current standard.

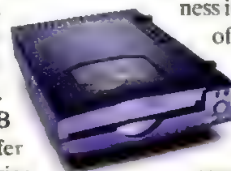
You can buy Zip Drives in internal ATAPI and SCSI models, in external parallel-port and

SCSI models, and as the external Zip Plus, which works with either parallel port or SCSI. Effortless installation under all DOS and Windows versions is a major plus, as is Iomega's Guest, software that lets you plug a Zip Drive into any computer and use it without rebooting.

The Zip Drive's major weakness is the notorious "click of death" syndrome, in which a disk begins clicking when inserted into a drive or when first accessed. One or more files—and sometimes the whole disk—becomes unreadable.

Iomega has acknowledged that a small fraction of one percent of Zip Drives suffer from this syndrome. We haven't experienced this problem, but you can access online literature on the subject through the Gibson Research Web site (www.grc.com), which also offers a free utility for Zip Drive testing.

Is the Zip Drive the floppy disk drive of the future? The answer seems to be yes—and no. Unlike the LS-120 SuperDisk drives, Zip Drives cannot read 1.44MB disks. Some recent BIOS versions let you set up a Zip Drive in floppy disk mode, making it easy to boot from a Zip Drive, but you'll still need a 1.44MB floppy disk drive. If you want to be able to share removable disks with other users, they're more likely to have Zip Drives than anything else.



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Tell us what you think... How do you like the new products you're using? Second Looks is your forum for feedback. Join us online to tell us about your experiences. We discuss a different new product every week and summarize your comments here. Below are just a few of the comments from our discussion of online communities.

Newsgroups still the way to go. So far, all of the online communities I've seen have been pretty lame. For the time being, I'll stick with newsgroups and bulletin boards

—Paul Zorovich

I think that for newbies (or neophytes, whatever you want to call them), online communities are just fine, but for advanced users, nothing beats the personal start page of your ISP.

—Grant Miller

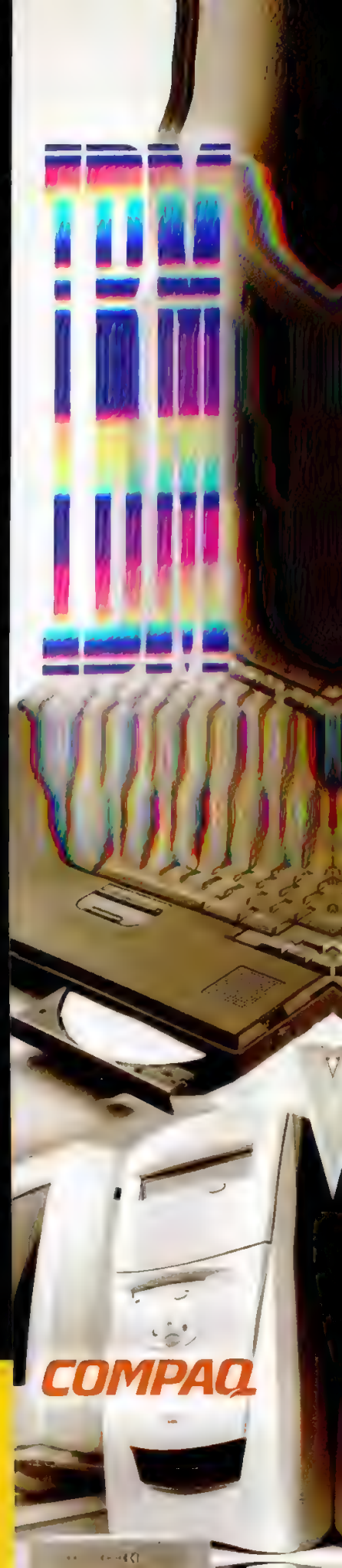
I miss BBSs and News Groups. Let's face it, there's currently no place on the Web that can match the kind of community camaraderie found on BBSs and news groups. Has any out there really gotten into the kind of heated discussions that was found on Echo or the Well?

—Fred Frize

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Make a Masterpiece

The biggest problem with giving a good performance is that you've got to do an encore. Last year, the pastor of my church handed me a stack of photos and asked me to do a multimedia presentation that summed up the church's activities in the past year.

I probably should have used one of the sophisticated multimedia presentation tools that sync to time codes, because the slides were to be accompanied by music, but for the sake of simplicity I used Microsoft PowerPoint—admittedly not the best tool for combining a music track and pictures.

I wasn't trying to synchronize image changes to the beat; I just wanted the music and images to play together and end together. I discovered that PowerPoint is very sensitive to the speed of your system and the amount of compression in your photographs. The speeds of wipes and transitions aren't constant either. So when I moved the presentation from my desktop to a laptop, audio and images were out of whack. I had to lengthen the music and compress the images in order to get them back in sync. It's a pain to work a couple of days on a presentation and have to tune it to a specific machine, but the alternative would have been investigating and selecting a multimedia tool, learning it, and possibly using it just once.

No danger of that, as things turned out. My pastor just handed me another stack of photos and assured me that I could do an even better job this year. Keeping in mind what I'd learned last year, I scanned in the photos and used Paint Shop Pro 5's handy batch conversion capabilities to compress all of them after I'd cropped and color-corrected them. I built the pages quickly with PowerPoint, using a template with our church's logo. The first part of the presentation, however, had our annual goals and a status report on how we'd done, and the second part was the pictorial tour of the church and our activities. I decided that the music should be different for the first and second sections and that the first section should have a narration track, to lead the audience through the slides.

As with last year's show, I chose a common hymn to accompany the photos, but with a strong rock beat behind the well-known melody. I keyed the melody into Band-in-a-Box (www.pgmusic.com), figured out the chords,

picked a musical style (Band-in-a-Box has the unique ability to apply the styles of famous musicians to the music of your choice), and let it write the accompaniment and harmony. I looped the chorus enough times to cover the slides and pasted a closing phrase onto the last chorus.

By the way, to get PowerPoint to play a MIDI file, you have to drop the file onto a page as an animation object, make it as small as possible, and then put it in a corner where it won't be seen. An advanced option lets the music play behind the slides.

I wanted the music behind the narration to be much lighter, though, and decided to record a solo guitar rendition of the same hymn with fingered melody and occasional chords, at a slow but loose tempo. I used PowerTracks Pro Audio (also from PG Music), which, like other modern MIDI sequencing programs, allows you to mix MIDI and WAV audio tracks. I used just the audio portion for this project. The guitar alone sounded a little thin, so I beefed it up by accompanying myself on an electric bass, plugged right into the PC's microphone jack and recorded on another track. Then I recorded my narration on a third track. After numerous takes to get everything right, I timed the delays in the text slides to the narration.

The end result? Terrific! The audience loved it. The presentation begins with the guitar solo and the narration and moves through the text slides. Then

during a fade through black, the hymn returns with a strong beat, driving guitar, and double handfuls of harmony (Nat Cole style) on a Rhodes electric piano. The pictorial slides follow, and everything ends together. I did the presentation in a medium-size church with my trusty Gateway Solo 9100 laptop, the Altec Lansing USB speakers and subwoofer, and the diminutive but powerful InFocus LP425 DLP projector.

Even if you're not musically inclined, you could do the same kind of killer presentation with prerecorded music. Try it; make your next presentation a multimedia masterpiece. **PG**



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VisionMaster 502 (19.5" VIS)	TCO '95	0.27mm/dp	110khz	1800 x 1440@74hz	\$999
VisionMaster 501 (19.5" VIS)	TCO '95	0.27mm/dp	96khz	1600 x 1200@75hz	\$939
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Pro Lite 38b (with OSD, USB & Speaker)	TCO '95	0.279mm	62.5khz	1024 x 768@75hz	\$1,179



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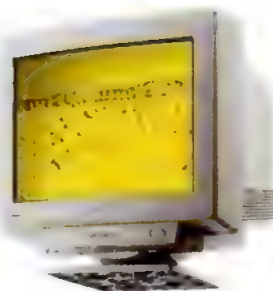
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Software Scheming

Over the years, I've concluded that various schemes to distribute software electronically were not workable. And in fact, none of them were. This may now be changing, and it's time to reconsider the mechanism. What we need is a fresh perspective

on how to make it work.

By *electronic distribution* I'm not referring to direct sales from the vendor, although this can easily be part of the bigger picture. I mean distribution of software at stores, where a customer can order a software package and have the disk produced on the spot. It's a continuation of the self-service, distribute-and-print, and just-in-time mechanisms becoming common today.

Using a high-speed satellite link delivering 100 Mbps, a CD's worth of data and code can be transmitted and burned on an 8X burner in minutes. With the newest full-color, high-speed laser printers, you can quickly print documentation and put the whole thing into an attractive package not too different from the ones we use today. I would take a look at those clear plastic disk/documentation boxes Microsoft used in the early 1980s. They'd be perfect for distributed manufacturing.

The software industry needs a new distribution mechanism. There's simply not enough shelf space in the stores for all the good software available. This has become clear to me as the image-editing software category has exploded with interesting selections. In the past few days, I've received photo-editing software from Adobe, Microsoft, and U-Lead. All are excellent packages with different twists on the same idea. There are a dozen other companies making such software, and users tend to buy more than one package from a category if they find it useful.

Unfortunately, the stores will carry a small selection of products that they can be assured will sell through. Inventory turns, as they call them, are king. Thus the unknown products as well as the highly specialized ones won't get any shelf space. Worse, in today's retail environment, vendors actually have to pay for their spots on the shelf; and they must sell through, too. This isn't good for the buyer or the small developer. Most digital cameras come bundled with Adobe software, and if someone buys an additional package, it's from Microsoft. The rest struggle.

If the stores had a system whereby every editing package were available electronically, to be manufactured at the store,

then a Sears catalog-like business could emerge. You'd see what was on the shelves, but there'd be a catalog you could look through as well, with complete descriptions of the software. The kicker would be either a demo or a sample that you could play with in a viewing booth or workstation area, in

much the same way that you listen to CDs in record stores (actually a concept that goes back 50 years and was reinvented).

If all software vendors subscribed to a single set of e-commerce standards, then any store anywhere could download and manufacture any software system from any vendor and pay the fee for the product electronically. It would be a boost to small vendors everywhere, because overhead would be reduced significantly.

This kind of distribution mechanism would also minimize inventory problems and eliminate the stocking of out-of-date code. Just-in-time manufacturing would modernize and make profitable many smaller stores and software developers. In fact, it would allow rural "country" software stores to exist just as Sears catalog stores existed in areas that couldn't support full stores.

Another benefit of such a scheme is instant registration. During the just-in-time manufacturing process, buyers would be registered for updates on the spot. As most vendors know, getting people to register after they buy is almost impossible.

While I'm doubtful that such a distribution scheme would unseat marketing giants such as Microsoft, it would give

people the selection they're losing. Pure online sales have potential, but not in the same way as a standardized system that involves a retailer to whom you can turn for advice and refunds. The small software store has come and gone and evolved into superstores with no selections.

Software is one of the few products that can be distributed in new ways. There's no reason to assemble a box of paper and disks in San Jose for shipment all over the world. The process is idiotic, since the manufacturing can be fully distributed and done just in time. I think it's time to reconsider the electronic-distribution schemes of the past, which were clearly ahead of their time.



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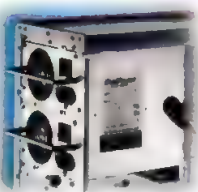
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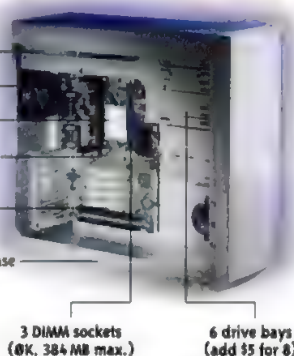
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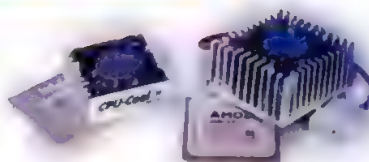
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Inside Track

Whither Merced? Probably the least talked-about chip in the past few months is the Merced, which has gone to the **publicity back burner** faster than anything I've ever seen. It's interesting how a delay can do that. At the company's recent developer forum, Intel actually booted up a **would-be version of Windows NT** running on a Merced emulator on top of a Pentium. Intel plans to release the software so developers can write Merced-optimized code. The actual chip is expected to be available in sample form in mid-1999. At least that's what the company hopes.

At the same conference there was discussion about the **sales brick wall** that high-performance computers have hit. Nobody is interested unless they're cheap. Well, also because there's no compelling reason to have them. I've concluded that all along people only wanted **faster hard disks**, and now that the hard disk business has outpaced the processor, we're caught up with our computing needs for the foreseeable future.

It's now apparent that hard disks were the key to understanding growth. Needless to say, most people who hear this evaluation think **I'm a crackpot**. But the brick wall is undeniable. In the midst of all this comes Katmai and **Katmai New Instructions (KNI)**. The new chip boasts 70 new instructions and 8 new 128-bit registers, all of which have been added to the standard x86 architecture.

MMX was supposed to add all sorts of multimedia capability (which it didn't); Katmai is also supposed to add all sorts of new multimedia capability. The term *multimedia* is already out of fashion, yet Intel persists. Supposedly, it will be easier to do **actual MPEG-2 encoding** (the hard one to do) with this kind of chip. The chip can also do multiple things at once. The 3-D aspect of the chip, though, still seems up in the air.

Laptop Crackdown Dept.: Recently, I mentioned the report of a guy getting **stopped at the border** to have his laptop's files examined. It happened to *Communications Week* senior editor Kenn Cukier at Waterloo Station in London as well. Apparently, this somewhat new policy is causing a ruckus in England, where there are various reports of customs officials doing laptop scans. This appears to be an effort to stop child pornography from entering England. Not everyone is convinced.

Here are some clips from various news sources regarding the policy: "All travelers entering the country should be prepared to have their equipment scanned."—a spokes-

U.S. Customs asked a Canadian businessman to boot his computer, and his wallpaper was a seminude picture of his girlfriend. Next thing he knew, he was grilled for hours and then accused of smuggling software.

advance that suggests the owner of a computer may be carrying suspicious material, that's when we are likely to want to search a computer. . . . But on a day-to-day basis we will not check computers."—a customs spokesperson, Press Association, U.K. "We're targeting people who fit particular profiles."—a U.K. customs official in BBC Online.

Other reports indicate that any single **porn image** ("by whose standards" is an issue) can result in the confiscation of your computer. And any **encrypted files** found will result in a court order to unlock them. If you don't unlock them, then a contempt-of-court citation may be imposed, with resultant **imprisonment**.

Before you condemn England for this, I should mention that a **Canadian businessman** claims that this happened to him while crossing the border into the United States from Windsor, Canada. U.S. Customs asked him to boot his computer, and his wallpaper was a **seminude** picture of his girlfriend. Next thing he knew, he was **grilled for hours** and then accused of smuggling software. He apparently made a fuss about this by getting an attorney involved and says that now he is **routinely harassed** at this one entry point.

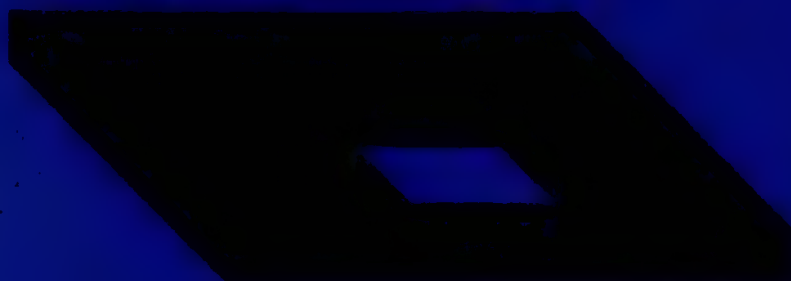
I have no idea whether there is any truth to this, but something seems to be happening. There are too many of these stories going around. Whatever the case, it seems **prudent** not to have JPEGs or GIFs you got online or elsewhere, no matter what they depict. Keep all business, professional, and **confidential material** on the server at home. Access it from the Net. In some of the forums people have started around these issues, there is a suspicion of **state-sanctioned industrial espionage**, although that seems like a stretch to me. And most important, don't be a jerk to the customs personnel.

Internet Years Dept.: I found an interesting AP story reporting the bust of a **threesome** who opened an Internet bank. They were operating something called the Netware International Bank and guaranteed a 20 percent return on savings, low-interest credit cards, and cheap loans. According to the AP, "The bank wasn't recognized by any state or federal regulator and hadn't applied for a license. . . . Defendants used money they received to **buy a boat**, an airplane and a Jeep for their own use. . . . The indictments were the result of an 18-month investigation by the FBI, IRS, and U.S. Postal Inspection Service."

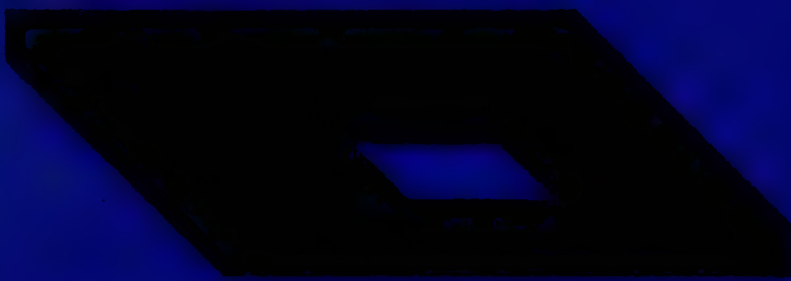
Let me get this straight: These folks had no license and the bank wasn't recognized by any regulator, so what ex-



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The Ultimate Win 98 Install Tip

My stats aren't as interesting as Mark's, Sammy's, or Roger's, but I'm having a pretty good season too: So far I'm 19 for 24. That is, I've installed Windows 98 24 times now, and the process has gone smoothly 19 of those times. The other 5 upgrades took some

work—in 4 out of 5 cases, Microsoft's pigheaded installation routine was at fault—but I got all of them except the first running within half an hour. Based on what I read, what I hear from others, and your mail, that 19-for-24 record (and 24-for-24 tally for eventual success) means I'm close to leading the league.

The most interesting experiences haven't been the 19 painless installs, of course, but the 5 that had problems in one way or another. I don't claim to be a Win 98 expert, but I do think my problems are probably pretty typical. If you've had problems upgrading a PC to Win 98, or have been holding off upgrading because of horror stories you've read and heard about install problems, then my experience should be useful.

And I'll let you in on a little trapdoor, installed courtesy of the Redmond crowd, that's very likely the villain in most failed Win 98 installs. It turned the one installation that took me 6 hours into a nightmare, but now you and I can solve that nasty problem in a minute or two.

The machines I've upgraded have all been Pentiums, ranging from an ancient 120-MHz desktop to several more or less current 300-MHz and faster boxes. There were a couple of Pentium/133s, and a bunch of 166s and 200s in between. I haven't yet tried (nor do I plan to try) upgrading any 486 machines; let sleeping dogs lie. Sure, 486s can still do useful work, but they're just not appropriate platforms for the latest-generation operating system.

And by the way, no, I don't have 24 PCs. Several of these machines have been in my offices, most have belonged to friends who importuned me to do what they were afraid to do, and a couple were spur-of-the-moment upgrades in clients' offices, where I did it as a kind of demonstration.

One of the five failed (let's say *troubled*) installs involved a Number Nine Imagine 128 video card. I love Number Nine's products but have run into Win 95 upgrade problems with the Imagine before, and so I shouldn't have been surprised. It took about 20 minutes to get the machine to run in anything other than 640-by-480 resolution after the move to

Win 98. I kept installing the latest video drivers for the Imagine, and the card still didn't work. Finally, about a dozen reboots later, I tricked the machine into running at 1,280-by-1,024, which was what I wanted—and it's been perfectly stable, with the Imagine's usual fast video, ever since.



MICROSOFT WAY
If they hadn't
adopted a brute-
force approach,
fewer upgraders
would get in
trouble.

The remaining four problem upgrades all resulted from the nasty, behind-the-scenes work of a new Windows "feature": the almost unknown but evilly pernicious Version Control Manager.

Tired of hearing about customers' problems with old, outdated, idiosyncratic, and just plain weird drivers, Microsoft decided that Win 98 should clean up any drivers it finds at installation that it believes are old, outdated, or nonstandard. This is handled by the VCM, which first backs up those drivers, then (invisibly) overwrites them with what Microsoft believes are safe, up-to-date, generic, and broadly applicable drivers. The result rarely keeps an upgraded machine from booting but may very well disable key subsystems, because Microsoft's replacement files often just don't work with commonplace peripherals.

If you have a SCSI card in your PC or if you rely on a Twain.dll to control a scanner, digital camera, or other imaging device, the VCM's probably gonna get you. It will wipe out your SCSI driver and Twain file, replacing them with Microsoft-crafted substitutes, and in the process it may well wreak havoc on your machine.

In the best Microsoft fashion, the VCM is almost completely undocumented. In the worsening world of products without documentation, the VCM is a poster child for the problems a lack of documentation can bring to PC users. (This is also a good example of what happens when a vendor's hubris takes over—but hey, this is Microsoft, otherwise known as Hubris "R" Us.)

Fortunately, though the VCM does its work without asking permission, it makes reversing its damage easy—if you can find it. Bizarrely, the Version Control Manager is hidden six layers deep in the Windows 98 maze (oops, *interface*), and your chances of finding it, or even knowing of its existence without a little help from a friend, are small indeed.

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JIM SEYMOUR

Here's how to get to the VCM: Click on Start | Programs | Accessories | System Tools | System Information | Tools | Version Conflict Manager. Get through that and you'll have a small window that lists every file the VCM "updated" during the installation process. Just click on the files you want returned to their original states, then click on Restore Selected Files, and the chances are very good that you'll be back in business. Four times out of four it's worked for me, and it's always worked for the dozens of friends, coworkers, and clients I've told about the VCM, too.

If Microsoft hadn't adopted such a brute-force approach to the VCM—for example, if Win 98 *asked* during install whether you'd like to replace file Xyz.dll with a later version Microsoft *believed might be* an improvement—fewer upgraders would get in trouble. But Win 98 doesn't work that way, with the result that far too often, upgraded machines just don't work properly any more.

Take note of that convoluted path to the Version Control Manager, and pass this tip along to your friends. I've become convinced that the VCM problems are at the root of 90-plus percent of Win 98 installation failures, so this one can really save your bacon.

Hot tip: I'm a long-time user of Adobe Photoshop, and I consider it a basic part of my toolkit (even if after all these years, it's still a bear to use). But a brand-new program, NetStudio, has replaced Photoshop for me at least 75 percent of the time when I create Web graphics.

NetStudio makes creating even very sophisticated Web graphics—such as complicated fades and cross-fades, automatic drop shadows, and much more—incredibly fast and easy. It has an endless undo capability that encourages experimentation, the familiar interface looks like Microsoft Word's, and it works beautifully with the market-leading Web site design package Microsoft FrontPage (and with the peerless professional tool NetObjects Fusion).

By stripping out almost everything necessary for print design and preproduction but irrelevant to Web work, NetStudio has become an exemplar of a new class of programs: They are easy to use but so capable that professional users will find them irresistible for their productivity boosts.

At \$130 on the street (and shipping, I hope, by the time this column appears), NetStudio is one of the software bargains of the year. And a heck of a lot of fun. **PC**

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Software for the Rest of Us

First they made it too hard. Then they dumbed it down too much. Now we're beginning to see software that's useful to the middle range of users. That is, we now have programs designed to be in sync with the needs of mainstream users who have to create projects

but who don't have the time or inclination to learn (and not forget) all the commands of the highest-end software.

Graphics software is leading the way. Word processors and spreadsheets might benefit from a third level, too, but it's not going to happen: The Microsoft Office juggernaut would crush virtually any start-up. The best you can hope for is more helping-hands wizards from Microsoft Office at the high end, and the possibility that the somewhat forgotten Microsoft Works might become a bit more robust at the entry level. You'll also see the upcoming Microsoft Office 2000 (Word, Excel, and PowerPoint) automatically removing unused tools from the toolbar over time (they'll still be available via menus), so the product will look less daunting to users with limited needs.

Among graphics software programs, Adobe Photoshop is a wondrous tool for retouching photographs and other bit-mapped images. But it costs \$600 (street), it's a bear to learn, and unless you use it continually, you lose it—that is, your familiarity with how to make Photoshop work well and how to make it do your bidding.

The biggest midrange opportunity lies in the realm of image-editing programs. It's a fast-growing segment with no dominant player. Over the past two years we've seen Adobe and Microsoft come out with personal image-editing products for well under \$100: Photo-Deluxe and Picture It!, respectively. If you want to remove red-eye from a flash photo or retouch out a telephone wire from a real-estate photo, these and similar products (such as MGI Photo-Suite) get the job done. Though they're getting better, many of these packages eventually run out of gas and keep you wishing for more features—but not so many that you'd wind up with the complexity of Photoshop.

The image-editing program likely to legitimize the middle-ground category is the new Microsoft PhotoDraw (\$150 street), which will also be bundled in the highest-end version of Office 2000. It has more capabilities than the low-end programs, the interface doesn't suffer from terminal cuteness, and it works with both bitmap and vector images.

Traditionally, you used one program for photos or paintbrush images (bitmaps) and another to work with illustrations made from shapes and fills (vectors, as CorelDraw creates). My only concern is that some of the PhotoDraw features were hard to figure out in the late beta version I

worked with. That, and some special effects that could gunk up presentations.

Nonetheless, I believe most businesspeople and many Web site designers will benefit from having programs like PhotoDraw. And it's going to be a terrific companion to Microsoft Publisher, which has crept up in quality over the years and probably qualifies as another midrange product. It will be interesting to see whether Adobe repositions PageMaker, currently a higher-end but not highest-end product, to compete against Publisher.

Another new, somewhat more specialized midlevel to upper-level program worth checking out is Actrix (\$350 street), from Autodesk. Actrix is very much like Visio, the popular build-graphics-with-shapes program. Autodesk claims perfect compatibility between Actrix and its AutoCad family of design programs.

I wish there were a way to make the presentation programs—such as Lotus Freelance Graphics and Microsoft PowerPoint—a bit easier for presenters to use. They also could be easier to use for creating presentations, but often that task is shunted off to a savvy admin who knows more and earns less than the boss. It's painful to watch businesspeople screw up

otherwise polished pitches because they don't know how to move their presentations backward one slide (hint: try hitting P, as in *previous*) or can't shift their laptops into external-monitor mode without rebooting so the systems can auto-sense their external connections.

You'll notice that I'm quite bullish on Microsoft software. Say what you will about its business practices, the main reason Microsoft is number one in so many areas is that it puts in more effort than any other company. And if it gets things wrong the first time, it goes back to the drawing board and eventually gets on track. Who knows? Maybe even Bob will be back one day. **PC**



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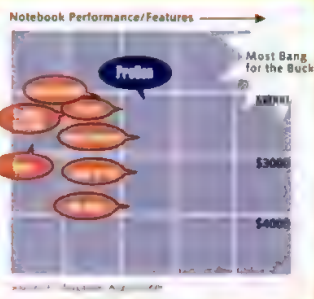
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The background of the page features a large, stylized logo for Windows NT 5.0. The letters 'N' and 'T' are in a dark, textured font, with the 'T' having a horizontal bar that is a lighter, textured grey. Below 'NT' is a large, teal-colored '5.0'. The word 'PREVIEW' is written in white, bold, sans-serif capital letters across the middle of the '5.0'. The entire graphic is set against a background of yellow and light blue geometric shapes.

BY LARRY SELTZER

Get ready, corporate America: Microsoft's Windows NT 5, the Microsoft platform for every part of your business, is starting to appear over the horizon. With Windows NT 5.0, Microsoft is trying to make a dramatic leap forward in every aspect of the product. As a corporate client, Win NT 5 is easier to use and manage. As a file server, it's more scalable and flexible. As an application server, it supports huge data sets. As an Internet/intranet server, it is more secure and standards-based. Win NT 5 has one more scheduled beta im-

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As Microsoft prepares to roll out the most new and improved version of **Windows NT** in the six-year history of the product, we test beta 2 to tell you what to expect.

its cycle and is expected to be released sometime toward the middle of 1999. When it hits the market, we expect that the enhancements it offers will cement Win NT's future as the corporate desktop of choice and accelerate its respectability as a mission-critical server.

The most important new features in Win NT 5 are based on the new Active Directory, which makes Win NT clients more powerful and networks running Win NT far more manageable. Active Directory is a distributed database of user and resource information that

describes the network, users, application settings, and just about anything that administrators and programmers want to put in it. Not only does it replace Win NT's antiquated domain structure with a more flexible and scalable one, but it also provides a way for application settings to be distributed across the network.

At the same time Win NT continues its march into enterprise computing, it makes major advances on the desktop, especially (and here's the catch) in pure Win NT 5 networks. All on its own, Win-

dows NT Workstation 5.0 is more usable, more reliable, and a better notebook system, and it supports new types of hardware.

On a network with Windows NT 5.0 servers, Workstation 5.0 users can move hither and yon to any Win NT 5 system on the network and maintain their individual settings, such as desktop icons, favorites, drive and printer mappings, and so on. This means not only that a user can move from one computer to another, but also that giving a user a new computer is a simple

matter. Active Directory is what enables all this, because user settings are kept in the directory.

These features are part of Microsoft's efforts in the movement to lower total cost of ownership (TCO). Win NT 5 is definitely a "fat client," but Microsoft keeps enough information on the server that users get some of the benefits of thin clients as well. Specifically, Win NT 5 helps to centralize system configuration and backups of personal data files.

Another chapter in the TCO story is that Microsoft has

Setup and Migration

The ability to roll out Win NT 5.0 incrementally across your network and script the installation should make the move to Win NT 5.0 smoother than any previous network upgrade.

page 114

File and Print Services

The new Windows NT File System and its improved printing capabilities look to bring Windows NT 5.0 up to par with what you'll find in NetWare today.

page 117

Application Servers

Server-based apps such as accounting systems can improve manageability by using the directory. Win NT improves scalability by supporting more-than-4GB systems.

page 120

Mobile Computing

Move from your desktop to your laptop to another user's computer; you can still maintain all of your settings and get access to your files—even off-line.

page 111

Administration

Improving TCO is a central goal of many corporations. Windows NT 5.0 lets you install software remotely, control what your users are doing, and keep client-PC software uniform across the enterprise.

page 124

NT Workstation

In Version 5.0, reliability has been improved as has compatibility. It goes beyond reliability with impressive personalization features and has the most advanced interface of any version of Windows.

page 104

Active Directory

Truly the hub of Windows NT 5.0, Active Directory is Win NT's first bona fide directory. Active Directory touches on every aspect of Windows NT's new functionality.

page 102

Security

A secure network is always important. Windows NT 5.0's new standards-based approach to authenticating and its several choices for virtual private networking improve your options dramatically.

page 130

finally rectified a mistake it made when it originally designed Win NT: It failed at that time to define standardized installation APIs (application programming interfaces), allowing installation of Windows apps to remain a confused mess. The new installer APIs in Win NT 5 will finally begin the process of letting Windows manage programs the way they should be managed. Of course, older applications won't use the new APIs, but long term, third-party uninstall software should be a dead notion.

What may be most significant about

the installer APIs is that they can install an application on demand. If someone sends you a data file for a program not on your PC, and the install files for that application are on the network and have been made

available through Active Directory, Win NT 5 will install the program automatically. The new APIs also let programs be installed partially—one component at a time—as well as be updated on the fly.

Our Contributors: LARRY SELTZER is the technical director of PC Magazine Virtual Labs. BEN Z. GOTTESMAN is a technical director and KEVIN YOUNG is a project leader of *PC Magazine Labs*. STEVE RIGNEY is a contributing editor of *PC Magazine*. RICHARD V. DRAGAN is a programmer at PC Magazine Labs and a frequent contributor. ROBERT P. LIPSCHUTZ is the director of the technology center at Viant, an Internet consulting firm. JAY MUNRO was the senior project leader, and DAVID LIDSKY was the associate editor in charge of this story.

ACTIVE DIRECTORY

By Robert P. Lipschutz

The word *directory* is one of those overused terms that mean many things to many people. On the desktop, directories are places to store and organize files. On the Internet, Four11 and WhoWhere? are directories for finding people. For the network administrator, the most important directory is the one that stores information about the users, groups, printers, file shares, and other resources on the administrator's own network. The directory is where the network administrator lives day to day, adding new users and groups and giving and taking away access to files.

Microsoft's Active Directory is the new directory found in Windows NT Server 5.0 that has just that role. Active Directory is a big step for Microsoft in that it has gone to a fully distributed directory that should work better in a large organization. Microsoft also hopes Active Directory will be used not just for managing access to files or printers, but for all of a company's networking and infrastructure applications.

This puts Microsoft Windows NT 5.0 in direct competition with NetWare Directory Services (NDS). If you're running NetWare and want to run Win NT 5 as well, you will have to choose which one will be your directory server. You could run Win NT 5 for other purposes, such as your intranet.

SO WHAT IS ACTIVE DIRECTORY?

Active Directory is Microsoft's implementation of a hierarchical, object-based directory service primarily used for the management of Win NT users, groups, and other resources. Active Directory uses two well-known Internet standards: Lightweight Directory Access Protocol (LDAP) as native protocol for directory access and the Domain Name Service

(DNS) as the naming locator service.

Support for LDAP—a simplified, standard directory-access protocol that defines how to access information in a directory—means that off-the-shelf applications using LDAP can access Active Directory to find objects stored in the directory. The inclusion of native dynamic DNS (the Internet service that turns human-friendly names like *www.zdnet.com* into the hard-to-remember TCP/IP addresses that computers use) thankfully means the end of Windows Internet Naming Service (WINS), the now-unnecessary mapping service that converted Microsoft NetBIOS names to DNS names.

In Active Directory, domains are still king and are used as

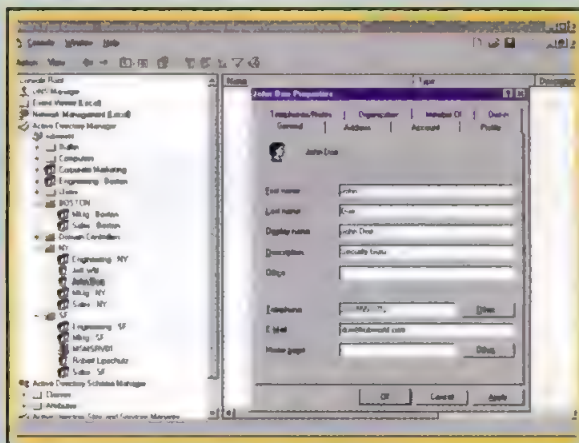
boundaries for security, administration, and replication. Domains can be organized into closely related trees with contiguous namespaces, or into loosely coupled forests of domains that trust each other.

GETTING YOUR HANDS DIRTY

The best way to understand Active Directory is to design your own organizational directory and implement this structure using the included tools. A typical hierarchical organizational unit (OU) structure might use regions (say, Los Angeles)

first, then functional areas (say, accounting). Groups spanning multiple OUs can be used to associate people who have natural functional relationships—for example, accounting people in different offices.

The primary tool you'll use for working with the directory is the Active Directory Manager, with which we added users and groups, created new OUs, moved departments around in the directory, and delegated the administration of groups to various network administrators. Adding printers worked well, but adding shared folders was a bit more arduous, requiring us to type in the Universal Naming Convention (UNC) names. We would have preferred to browse for the resource.



The primary tool you'll use for working with the directory is the Active Directory Manager.

Many of the features that make Win NT 5 a more robust and secure operating system are based on a new version of the Windows NT file system (NTFS). Some of these (such as user hard disk quotas, which let an administrator limit the amount of storage a user can have) are old news to NetWare and Unix shops, but they still only serve to make Win NT 5 more competitive with its rivals.

NTFS also improves system security in a number of ways, including an encrypted file system. Security is also enhanced in

Win NT 5 through support for IPsec, a secure-network protocol standard, and Kerberos, a standard for secure authentication on a network.

Win NT 5 is Microsoft's most significant effort to gain credence in the market for mission-critical enterprise server-based software currently run on Unix and host systems. Active Directory is in direct competition with NetWare to be your network's directory. Whether Win NT 5 is actually in a class with Unix for reliability and scalability and NetWare for manage-

ability is a matter that only testing the final, shipping product will decide.

In the future, Win NT will also be the basis for the consumer operating system that succeeds Windows 9x. Win NT 5 shows some glimpses of this, such as the new support for plug-and-play, but Win NT 5 is still too difficult for mass use. When Win NT 5.0 ships for real, it will doubtless have a large impact on the industry. Whether or not it gains acceptance as a "real" enterprise system, it's certainly an ambitious-enough product.

IN THE ENTERPRISE

Large companies will appreciate the fact that Active Directory replicates across multiple domain controllers in a single domain. Backup Domain Controllers (BDCs), which you'll find in the Win NT 4.0 architecture, are no more. Active Directory replicas can be used to provide fault tolerance and better performance across networks. Replicas keep in sync with each other using updates organized via Update Sequence Numbers (USNs), with conflicts resolved by accepting the changes that have the latest timestamps.

Typically, a small or sometimes a medium-size company can get away with one domain, but larger companies need several domains because of the traffic that is generated by replication updates between domain replicas.

Migrating to Active Directory from Win NT 4 is fairly simple, with a couple of snafus to look out for. You update your Win NT 4 Primary Domain Controllers first. This will move all

of your users and groups into the Win NT 5 Active Directory. Backup Domain Controllers can be migrated in a second step.

There are two problems you'll need to work through. First, while there are still Win NT 4 domains in your network, you must run Win NT 5 in what is called *mixed mode*. Unfortunately, mixed mode doesn't allow for nested groups, a very useful and almost necessary feature for effective group organization. Secondly, for now, your Win NT Workstation 4 and Windows 95 and 98 users won't have access to the Active Directory search (Microsoft may remedy this with service pack updates).

On large Win NT networks, the new domain replication model will be appreciated, but administrators of smaller networks will need to invest a lot of time learning the new tools and techniques to take full advantage of the benefits of Active Directory. If Microsoft can integrate the various management tools and finalize an integrated user toolset by the time Win NT 5 ships, Active Directory will have been worth the wait.

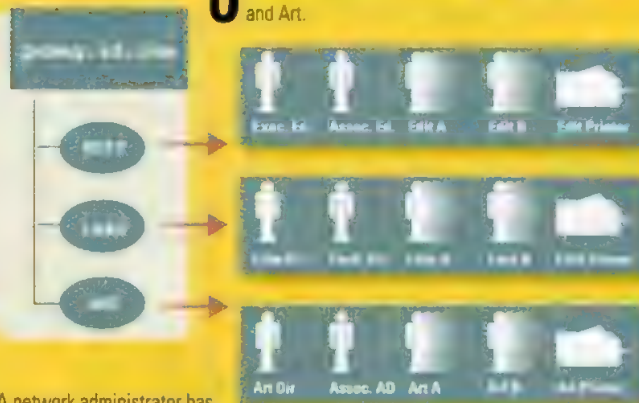
Trees and Forests

The heart of Windows NT 5 lets you set up everything within domains.

- 1** We see here two domain trees that might exist within Ziff-Davis, the *zd.com* and *softbank.com* domain trees. Each tree uses a contiguous name space.



- 3** The *pcmag.zd.com* domain has been further divided into three organizational units (OUs): Edit, Labs, and Art.



- 2** A network administrator has configured a trust relationship between the two trees, thus turning them into one forest. A forest is a group of trees that trust each other.

- 4** Users, groups, and network resources such as printers and shared folders are typically placed in OU containers.

WINDOWS NT WORKSTATION 5.0

By now, users expect two flavors of Microsoft Windows: the more accessible, more compatible, consumer-oriented Windows 95 and 98; and the more reliable, more powerful, Windows NT desktop for the corporate arena. Microsoft Windows NT Workstation 5.0 looks to be a viable alternative corporate OS to Win 9x for a wider audience than Windows NT 4 could garner, because of its interface enhancements, new plug-and-play support, and easier administration capabilities.

The big surprise in Workstation 5.0 is that it's a much friendlier Windows than

Workstation learns which programs you use most frequently and obscures the rest to you unless you choose to see them.

Win NT 4 or even Windows 98, with on-the-fly personalization and other new usability features. Even so, Workstation is still far too large and complicated to be a consumer operating system.

One of the niftiest capabilities is a personalized Programs menu. After you've used Workstation 5.0 for six sessions, your first option on the Programs menu will be the programs you use most frequently. The reason it takes a number of sessions before taking effect is that the system "learns" what you use and don't use and responds.

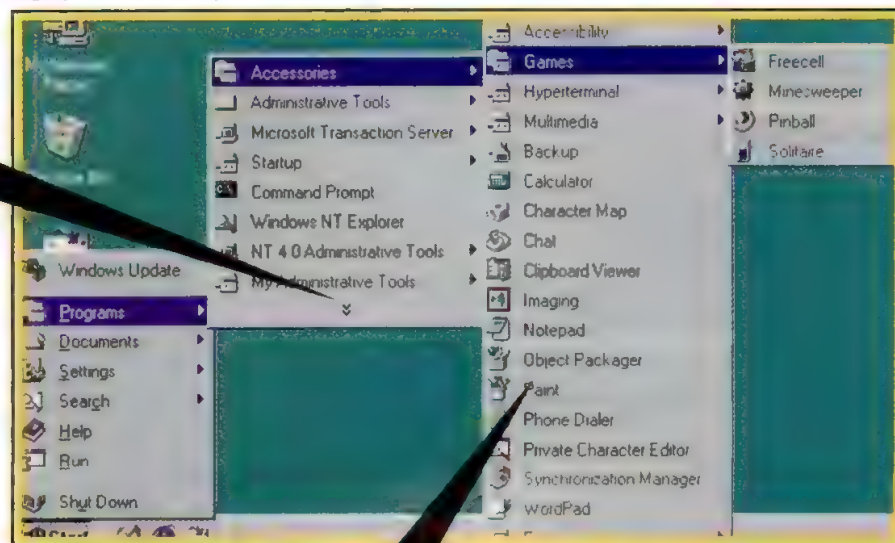
Click on the double chevron that appears below (or wait a couple of seconds), and your less frequently used programs appear. The exposed menu choices change over time to reflect which programs you access most frequently. Microsoft added this feature to make it easier for users to find the programs they use most often without having to sift through a sometimes daunting Programs menu. In testing, we found this feature extremely useful.

To help you manage the way you save and find work, Workstation 5.0 has a new Open/Save As dialog box. With an Explorer bar similar to what you see when using Microsoft Outlook or Outlook Express, a pane guides you to Recent Documents, My Documents, Network Places (for network

resources), and more. Most dialogs offer a browser feel, rather than the standard Win 32 dialogs seen in previous versions.

The My Documents franchise has been expanded to include a My Pictures folder for graphics files. Similar to in Windows 98, Workstation 5.0 dialog boxes include an image preview, which makes it easy to find the right image file quickly.

For searching content, Win NT 5 offers highly flexible dialogs for searching what's



on your local hard disk or on the Web. You can now find what's inside files (as well as file names and

other items as before). Content searches are much faster than traditional Find searches too, because the technology (which relies on Microsoft Index Server) keeps track of content behind-the-scenes as you do normal work.

Win NT 5 is also expected to run on a much wider array of hardware devices. The minimum requirements are slated to be a Pentium/166-based PC with 32MB of RAM.

Supported hardware is realistically geared toward today's corporate user, including native support for DVD, Universal Serial Bus (USB), and IEEE 1394 devices, taking full advantage of the latest hardware. To facilitate wider adoption, Microsoft has been working with third-

party vendors to certify device drivers in its Windows Hardware Quality Lab. Also, Win NT 5 drivers can now be signed digitally and automatically loaded by the system.

Importantly, just like Windows 95 and 98, Win NT 5 incorporates plug-and-play for detecting hardware on both desktops and laptops, for easier installation. With each new version of Win NT, more hardware was supported, but until now, Win NT lacked the same plug-and-play support that Windows 95 and 98 have. Our testing suggested that Win NT 5's Plug and Play works as promised, though certainly not every driver is included in this

Even when you do see your entire Programs menu, the programs that you use the most are highlighted.

preview release. Also of note is that system resources are managed by the Plug and Play manager rather than by

the drivers themselves, which lets Win NT assign and reallocate resources such as I/O ports, IRQs, and memory as needed.

The new Computer Management console lets you track and configure all hardware and software—including network options—and even view system events, all in one place. In our testing and setup, we found another real advantage: Win NT 5 doesn't reboot nearly as often as previously when you make changes to hardware settings.

With its promise of wider hardware support, greater ease-of-use and management, and unmatched administrator control for the organization, Workstation 5 may well be the first Win NT to earn more mass appeal.—Richard V. Dragan

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*Service and Reliability Survey, PC Magazine, July 1998
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- Intel Pro 10/100 PCI Ethernet Controller w/RJ-45 and Wake-On-LAN Technology
- 32X Max EIDE CD-ROM Drive
- 2 Universal Serial Bus (USB) Ports / DMI 2.0
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- MS Windows 98
- Corel Office Suite 8
- Carrying Case
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- 56K V.90 Fax/Modem*
- 24X Modular CD-ROM Drive
- 128-bit AGP Graphics Accelerator
- Integrated 16-bit Stereo Sound and Speakers
- Smart Lithium Ion Battery
- 2nd Lithium Ion Battery
- Mini-Docking Station
- USB and Fast IR Ports
- Integrated Personal Touchpad
- MS Windows 98
- Microsoft Office '97 SBE Ver 2
- Carrying Case
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- 1-year parts and labor limited warranty on all other components

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- 2X DVD-ROM Drive
- 128-bit AGP Graphics Accelerator
- Integrated 16-bit Stereo Sound and Speakers
- Smart Lithium Ion Battery
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- MS Windows 98
- Microsoft Office '97 SBE Ver 2
- Carrying Case
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T-1410 w/ Pentium II processor 300MHz \$2899

Quantex T-1411 \$3099

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- 512KB Secondary Cache
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- 56K V.90 Fax/Modem*
- 2X DVD-ROM Drive
- 128-bit AGP Graphics Accelerator
- Integrated 16-bit Stereo Sound and Speakers
- Smart Lithium Ion Battery
- 2nd Lithium Ion Battery
- Mini-Docking Station
- USB and Fast IR Ports
- Integrated Personal Touchpad
- MS Windows 98
- Microsoft Office '97 SBE Ver 2
- Carrying Case
- 3-year limited warranty on CPU and Main Memory
- 1-year parts and labor limited warranty on all other components

T-1411 w/ Pentium II processor 300MHz \$3099

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- Smart Lithium Ion Battery
- USB and Fast IR Ports
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- ATI 3D AGP Graphics Accelerator w/8MB
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- 104-Key Keyboard with MS Mouse
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QP6/350 M-1x (with Pentium II processor).....\$1299

SOFTWARE: Corel Office Suite 8 • MS Money '97 • Compton's Interactive Encyclopedia • Body Works 6.0 • Amazon Trail II
American Heritage Talking Dictionary • Internet the City • Compton's Reference Collection • Dr. Solomons Find Virus • MS Internet Explorer 4.0

QP6/350 M-2x \$1499

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- 56K V.90 PCI Fax/Modem* w/Voice Mail and Speakerphone
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- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS Mouse
- MS Windows 98
- Value Multimedia Software Bundle
- 3-year limited warranty with 1-year On-Site Service**

QP6/333 M-2x (with Pentium II processor).....\$1399

QP6/400 M-3x \$1799

Business lease: \$63/Mo.

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- Internal 100MB Zip Drive with one cartridge
- 56K V.90 PCI Fax/Modem* w/Voice Mail and Speakerphone
- New 3rd-Generation 4.8X DVD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS Mouse
- MS Windows 98
- Value Multimedia Software Bundle
- 3-year limited warranty with 1-year On-Site Service**

QP6/350 M-3x (with Pentium II processor).....\$1599

QP6/450 M-4x \$2099

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- 19" Monitor w/OSD (18.1" viewable), 1600x1200, 26dp
- Intel740™ 3D 2X AGP Graphics with 8MB SDRAM
- 56K V.90 PCI Fax/Modem* w/Voice Mail and Speakerphone
- New 3rd-Generation 4.8X DVD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS Mouse
- MS Windows 98
- Value Multimedia Software Bundle
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QP6/400 M-4x (with Pentium II processor).....\$1899

POWER MULTIMEDIA

QP6/350 SM-1x \$1249

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- Intel740™ 3D 2X AGP Graphics with 8MB SDRAM
- 56K V.90 PCI Fax/Modem* w/Voice Mail and Speakerphone
- 32X Max EIDE CD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS IntelliMouse
- MS Windows 98
- Power Multimedia Software Bundle
- Microsoft Office '97 SBE Ver 2
- 3-year limited warranty with 1-year On-Site Service**

QP6/400 SM-1x (with Pentium II processor).....\$1699

SOFTWARE: MS Office '97 Small Business Edition Ver 2 • MS Money '97 • Office Mate • Day Planner Pro • Power Business Plans • Form Designer Pro
• Project Manager Pro • Labels Unlimited • Compton's Reference Collection • Dr. Solomons Find Virus • MS Internet Explorer 4.0

QP6/400 SM-2x \$1999

Business lease: \$70/Mo.

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- 56K V.90 PCI Fax/Modem* w/Voice Mail and Speakerphone
- 32X Max EIDE CD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-45 1 Speakers with subwoofer
- Quantex ATX Mid Tower Case
- MS Natural Keyboard Elite with MS IntelliMouse
- MS Windows 98
- Power Multimedia Software Bundle
- Microsoft Office '97 SBE Ver 2
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QP6/450 SM-2x (with Pentium II processor).....\$2199

QP6/400 SM-3x \$2199

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- 56K V.90 PCI Fax/Modem* w/Voice Mail and Speakerphone
- 32X Max EIDE CD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-45 1 Speakers with subwoofer
- Quantex ATX Mid Tower Case
- MS Natural Keyboard Elite with MS IntelliMouse
- MS Windows 98
- Power Multimedia Software Bundle
- Microsoft Office '97 SBE Ver 2
- 3-year limited warranty with 1-year On-Site Service**
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QP6/450 SM-4x \$2499

Business lease: \$88/Mo.

- Pentium® II Processor 450MHz/100MHz Front Side Bus
- 128MB PC100 SDRAM Memory / 512KB Secondary Cache
- 16.8GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 19" Monitor w/OSD (18.1" viewable), 1600x1200, 26dp
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- MS Windows 98
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- Intel740™ 3D 2X AGP Graphics with 8MB SDRAM
- Internal 100MB Zip Drive with one cartridge
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- New 3rd-Generation 4.8X DVD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS Mouse
- MS Windows 98
- Value Multimedia Software Bundle
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QP6/400 M-4x SE (with Pentium II processor).....\$2099

QP6/450 SM-4x SE \$2999

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- 128MB PC100 SDRAM Memory / 512KB Secondary Cache
- 16.8GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
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- #9 Revolution IV 128-bit 3D 2X AGP Graphics with 32MB
- Internal 100MB Zip Drive with one cartridge
- 56K V.90 PCI Fax/Modem* w/Voice Mail and Speakerphone
- 32X Max EIDE CD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ADA-305 Dolby Surround Sound Speakers & subwoofer
- Quantex ATX Mid Tower Case
- MS Natural Keyboard Elite with MS IntelliMouse
- MS Windows 98
- Power Multimedia Software Bundle
- Microsoft Office '97 SBE Ver 2
- 3-year limited warranty with 1-year On-Site Service**

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- 19" Monitor w/OSD (18.1" viewable), 1600x1200, 26dp
- Intel740™ 3D 2X AGP Graphics with 8MB SDRAM
- 56K V.90 PCI Fax/Modem* w/Voice Mail and Speakerphone
- New 3rd-Generation 4.8X DVD-ROM Drive
- SoundBlaster AudioPCI 64V Wavetable 3D Sound
- Altec-Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS Mouse
- MS Windows 98
- Value Multimedia Software Bundle
- 3-year limited warranty with 1-year On-Site Service**
- Add Altec-Lansing ACS-251 Subwoofer for \$39
- Add an Internal Zip Drive for \$79

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QP6/450 GX-2 \$2499

Business lease: \$88/Mo.

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- 19" Monitor w/OSD (18.1" viewable), 1600x1200, 26dp
- Intel740™ 3D 2X AGP Graphics with 8MB SDRAM
- Internal 100MB Zip Drive with one cartridge
- 56K V.90 PCI Fax/Modem* w/Voice Mail and Speakerphone
- New 3rd-Generation 4.8X DVD-ROM Drive
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- MS SideWinder 3D Pro Joystick
- New Altec-Lansing ADA-305 Dolby Surround Sound Speakers & subwoofer
- Quantex ATX Mid Tower Case
- MS Natural Keyboard Elite with MS Mouse
- MS Windows 98
- Value Multimedia Software Bundle
- Activision Game Titles: Battlezone, Heavy Gear Interstate 76 w/Nitro Pack
- 3-year limited warranty with 1-year On-Site Service**

QP6/400 GX-2 (with Pentium II processor).....\$2299



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MOBILE COMPUTING

Microsoft Windows NT 4 made great strides forward as a functional desktop operating system for corporate client PCs, but one of the biggest impediments to its mass acceptance was the dearth of support for mobile computing. The OS supported neither power management nor plug-and-play, essential for swapping PC Cards and hot docking. Windows NT 5 will provide these capabilities but will also go much further, giving users greater data security and administrators greater control over mobile PCs.

Many mobile PC users split their time between being connected to the LAN, either via a network card or a modem, and working off-line. These users typically want to take their work with them when they disconnect.

If you are running a homogeneous Win NT 5 environment, you'll find a much better approach than Windows 95's Briefcase. Leveraging the new operating system's Synchronization Manager capabilities, users will be able to designate, through a simple option in Explorer, network files and folders that they want to

keep with them (see diagram below).

Folders from any System Message Block (SMB)-enabled server, such as any version of Windows since Windows for Workgroups, can be worked on off-line. Third-party utilities are also available to SMB-enable NetWare and other common file server platforms.

Mobile users are also concerned with the security of their files in case of unauthorized access to their computer. To address this, Win NT 5 adds the Encrypted File System (EFS) that will let users designate files and folders to be encrypted and only accessible with the proper public key. Third-party products that automatically encrypt files and directories have been around for years, but Microsoft's encryption should work at a lower system level and be less cumbersome and more reliable.

Notebook users aren't the only class of mobile users, however. Many people move from desk to desk within the same site or even to different sites throughout the workday. For these users, Win NT 5 provides Roaming Profiles. The profile stores many of the users' Desktop and

Start menu customizations on the server and redirects the My Documents folder to the server as well. When a user logs on to a new system, Windows on the new system will feel much as it did on the user's other computers. The network can also be configured to install the applications that the user requires wherever the user logs in. As with many Win NT 5 features that rely on the Group Policy Manager (GPM) though, we found the process of configuring roaming users overly cumbersome, requiring switching between Active Directory, Windows Explorer, and the GPM.

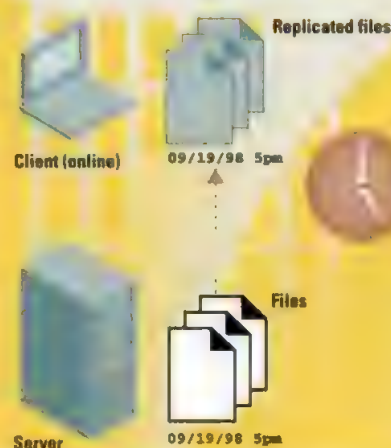
Win NT 5 should achieve parity with Windows 98 when it comes to mobile hardware support. Win NT 5 will add support for Advanced Power Management (APM) and hot-swapping of PC Cards, features that have been around since Windows 95. Win NT 5 will also support the Advanced Configuration and Power Interface (ACPI), a standard supported by many newer computers (mobile and otherwise) that will give the operating system much greater control over a system's power management capabilities.

If Microsoft can smooth out some of the rough edges, Win NT 5 will surpass Windows 98 as the best operating system for mobile computing.—Ben Z. Gottesman

Off-Line Folders Windows NT 5 gives you an easier way to work off-line.

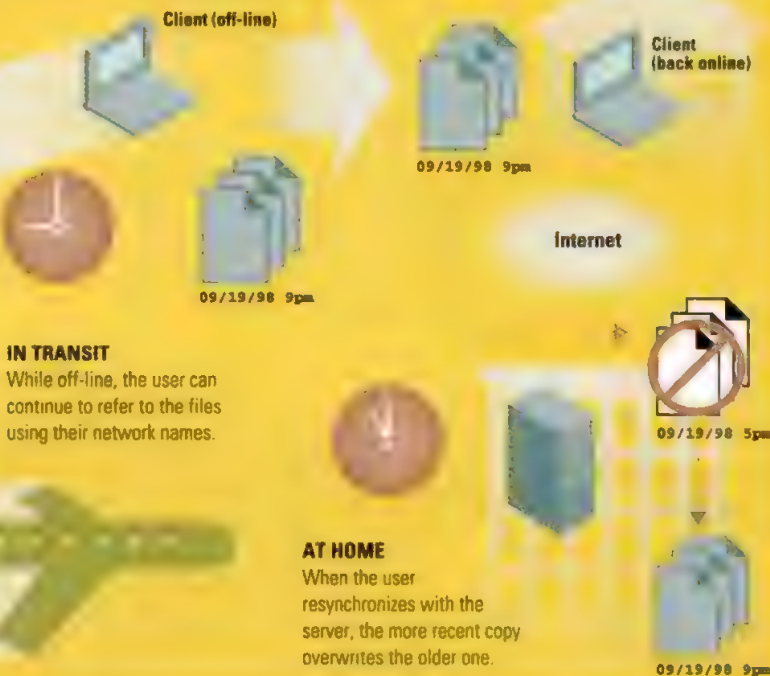
AT THE OFFICE

Windows NT 5 lets users bring network resources on the road without an active connection to the server. In the example here, the client synchronizes the notebook and specific data on the server using the Synchronization Manager.



IN TRANSIT

While off-line, the user can continue to refer to the files using their network names.



AT HOME

When the user resynchronizes with the server, the more recent copy overwrites the older one.





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SETUP AND MIGRATION

Microsoft wants Windows NT 5.0 to have the easiest setup and smoothest migration path of any version of Windows NT. That's not necessarily a high bar to hurdle, but it's a worthy goal nonetheless. And to an extent, Win NT 5.0 appears to accomplish this for both the Windows NT Server 5.0 and the Workstation 5.0 installations, through the addition of wizards and better configuration technology.

CLIENT INSTALLATION

Administrators in heterogeneous environments looking to upgrade users to Workstation 5.0 will find that they have a greater opportunity to do so. The migration path from existing systems has been widened with the ability to upgrade systems running FAT32 on Windows 95 or 98. You can upgrade Win NT 3.51 and Win NT Workstation 4 machines to Server 5.0 or Workstation 5.0. You can also upgrade Windows 3.x machines to Workstation 5.0, preserving network settings, but because Windows 3.x doesn't support domains, you'll have to configure your network settings manually during installation.

We found upgrading Windows 3.1, 95, and 98 to Workstation 5.0 relatively painless, involving picking up existing domain and network environments. If you are still running Windows NT 3.1, sorry, but you'll have to upgrade to Version 3.51 or 4.0 before migrating to Win NT 5.0. Because this is still a beta, upgrade success is dependent on the current hardware support.

Since Win NT 5 is larger than Win NT 4, the setup time has increased, mainly because of an increase in the number of files that get copied to your hard disk. The slowest install comes when you've booted from a DOS floppy disk and install. If your machine allows, a better (and quicker) answer is booting from the Win NT 5.0 CD-ROM. Upgrading from Win NT 4 or Win 9x was faster than a clean install.

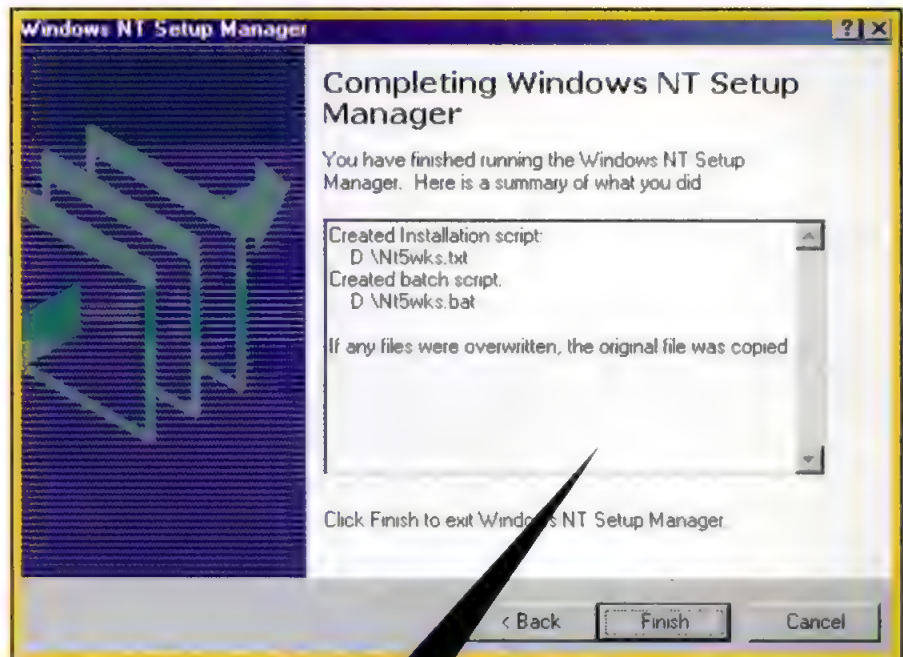
Microsoft is trying to render this type of time-consuming install a thing of the past, however. If you're going to be doing a lot of upgrades or installs, you can take advantage of Win NT 5's scripting capabilities to create installation routines that require no

interaction at all by your end users. Administrators can set up the machines to run the installs, then let them go.

For companies deploying multiple similar systems, Microsoft has made it easier to use third-party disk copy and imaging utilities, such as PowerQuest's Drive Image and Symantec's Ghost Professional, with Win NT 5. While most third-party disk-duplicating products provide either manual or automatic unique

You can now do an incremental upgrade to your network, bringing machines up to Win NT 5 as time and testing allow. As you upgrade, the remaining Win NT 4 systems in your network see the parts of the implemented Win NT 5 system as Win NT 4 machines.

Administrators familiar with installing earlier versions of Win NT will notice that Win NT 5's initial setup has a lot fewer steps. Under Win NT 5, you now can choose Custom or Typical network configuration. Microsoft claims fewer reboots for installation, configuration, and reconfiguration altogether. In com-



security ID (SID) assignments, Win NT 5's utility Sysprep now relieves users of that burden. Sysprep prepares the installation such that when it's booted for the first time on the new machine, it runs a mini-setup wizard that can be scripted, requiring you only to reenter names and IP addresses; Sysprep creates the new SID.

SERVER INSTALLATION

With every new version of Microsoft Windows, IS departments have to wrestle with the question of when and how to upgrade the server. Most IS managers are wary, and rightfully so, of an across-the-board upgrade.

The new Microsoft Windows NT Setup Manager wizard lets a system administrator create scripts for unattended installation easily. You can specify network components, directories, features, and network printers.

parison with the process for Win NT Server 4, our typical clean installation and full configuration of Server 5 had two reboots to Server 4's seven reboots.

Our Win NT Server 5 (with a Typical install) lacked the automatic IPX support we needed, so we had to go back and add it manually. But we did not have to reboot the machine to do this, something that Win NT 4 (as well as Windows 9x) does require.

While not a no-brainer, simpler installation and upgrading, duplication-friendly features, and the ability to deploy incrementally make the decision to migrate to Windows NT 5 a lot less painful.—Jay Munro

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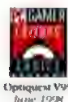
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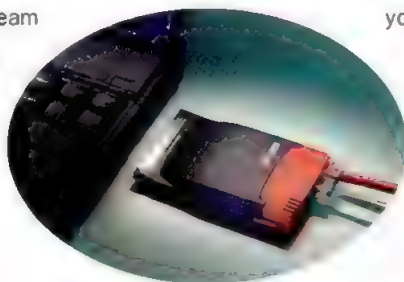
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FILE AND PRINT SERVICES

While many administrators tout Microsoft Windows NT 5.0 as the application server replacement for Unix, most of us realize that good old file and print services are all that many networks need. The improvements that Microsoft has made to Windows NT Server (as tested in beta 2 of Version 5.0) are only now beginning to rival the file and print services found in NetWare. The two major areas of improvement we saw are data storage and printing.

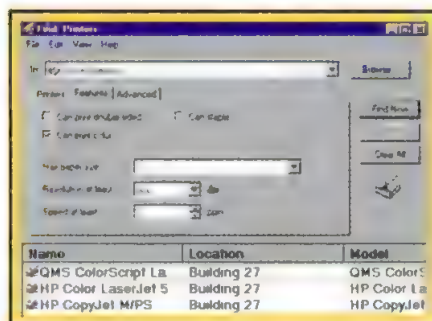
The way your data is stored, protected, and accessed is a very important consideration when you are evaluating a file operating system. Win NT 5 includes the new Win NT File System (NTFS) Version 5.0. While there are a lot of changes in NTFS 5.0, some of the most important ones enable you to find files by owner and to set up disk quotas for your users.

In our tests, we took a user's security ID (SID) and found all of the Word documents she had created on a 16GB NTFS volume. The bulk Access Control List (ACL) is a way to test to see which files a user can access. You can then limit what a user can do to a particular file or subdirectory. This is much easier than going to each file or directory and assigning the rights. Though you can control subdirectories in Windows NT 4, you can't manage rights on individual files. This ACL feature is new to Win NT, but has long

been available in NetWare.

Another new Win NT feature that NetWare users have taken advantage of for years is the ability to restrict the amount of disk space on which a user can store files. This is very important if you have a lot of users and limited disk space on your server.

After the data is on the server, you'll want to make sure it is protected. Win NT 5 includes a Hierarchical Storage Manage-



Win NT 5 lets you search for a printer based on its location and features.

ment (HSM) system that lets you off-load seldom-used data to inexpensive tape or optical media. The Win NT 5 HSM works only with two tiers, or two devices, and comes with built-in drivers for DAT, DLT, and autoloaders.

To manage your disk drives, Win NT 5 adds several new features to the disk management utility, now a Microsoft Management Console (MMC) snap-in. The new

Dynamic Volume Management feature let us extend the capacity of an existing volume without reformatting or even restarting the server. Likewise, the disk management utility has a newer interface, and we could use it to monitor and configure disk drives and volumes located on remote servers.

IntelliMirror is a nice feature if your users are constantly moving around and changing PCs. IntelliMirror also helps you control which features and applications your users can access, no matter which PCs they're using.

Network printing is the bane of every administrator's existence, and Microsoft appears to be trying to make this task easier. Win NT 5.0 includes a feature called point-and-print (or Autopublish) that let us automatically install a printer driver on a client PC from any application. For example, when we selected the print command in Word, we were able to browse the network for a printer. Once we found the network printer, Win NT 5.0 automatically installed the driver on our client PC.

Through the Active Directory, we were also able to search for a specific printer type and location, such as a color laser on the second floor of our building.

Win NT 5.0 should begin to rival NetWare as a file and print NOS. But taking advantage of most of Win NT 5's improvements requires a whole-hog commitment to its servers and a restructuring of your network around Active Directory.—*Steve Rigney*

Hierarchical Storage Management

Hierarchical Storage Management enables a server to off-load infrequently used data to slower storage while maintaining the illusion that the data is online. This frees up space on the network without inconveniencing any users who need older files.

1 A user requests a file from the server as usual

2 The server detects that the requested file has been off-loaded to a tape cabinet or CD jukebox.

3 The server then brings the file back online and fulfills the client request.





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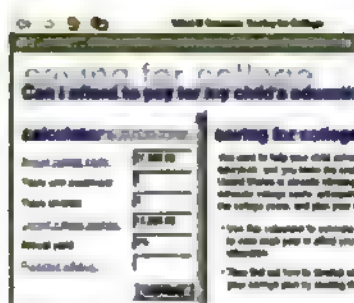


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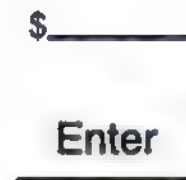
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APPLICATION SERVERS

Microsoft laid the groundwork for much of its architecture for Web and distributed computing (called Distributed interNet Architecture, or DNA) with the Microsoft Windows NT 4 Option Pack and other interim releases after Win NT 4.0 shipped a couple of years ago. The key addition to Microsoft Windows NT 5 is how Active Directory will let server-based applications, such as accounting systems, improve their own manageability by distributing some of their data through the directory.

Windows NT Server 5.0 Enterprise Edition otherwise doesn't contain much that is truly new in this arena, but the integration of Enterprise Memory Architecture (EMA) and improved symmetric multiprocessing (SMP) support and advanced scripting capabilities should make Win NT 5 a much better platform for high-end distributed computing.

Very high-end applications, such as data warehousing and other data intensive applications, can exceed the limit of 32-bit systems. Enterprise Edition lets applications take advantage of more than a 32-bit addressable memory space even before the Intel 64-bit Merced CPU arrives. It's important to note that Win NT 5 is not itself a 64-bit operating system (though a 64-bit version is planned).

The ability to make use of EMA address spaces—memory greater than 4GB—comes in two forms here. On hardware servers that use Intel Pentium II Xeon processors, you can swap banks of memory using a proprietary 36-bit addressing scheme. Intel calls this Extended Server Memory Architecture (see graphic below). Server 5.0 also supports Compaq's Alpha-based Win NT boxes, which support 64-bit Very Large Memory (VLM) addressing directly. Both of these schemes require explicit

memory management by the application, such as in Microsoft SQL Server 7, currently under development. This is clearly an interim step on the way to a true 64-bit system.

Win NT 5.0 makes it easier to increase the performance of server applications by adding extra processors to the system. Another Win NT Option Pack feature which is now standard in Win NT 5 is Microsoft Transaction Server (MTS), which makes it easy to divide tasks among processors by defining the tasks as transactions. Microsoft has also beefed up the support for symmetric multiprocessing systems, with licenses for up to eight CPUs in Enterprise Edition. The object model in Win NT 5 exposes the job object—a logically associated group of processes—as another system object for better processor control. Job objects can be managed as a single entity, and can have a quota set on their CPU utilization.

Modern Win NT server applications, such as the new SQL Server 7, are built as a series of COM objects. Under the hood, Win NT 5 relies heavily on COM for all its system objects. Because COM exposes objects programmatically, any object can now be scripted using the Windows Scripting Host (WSH) with VBScript, JavaScript, or other scripting languages.

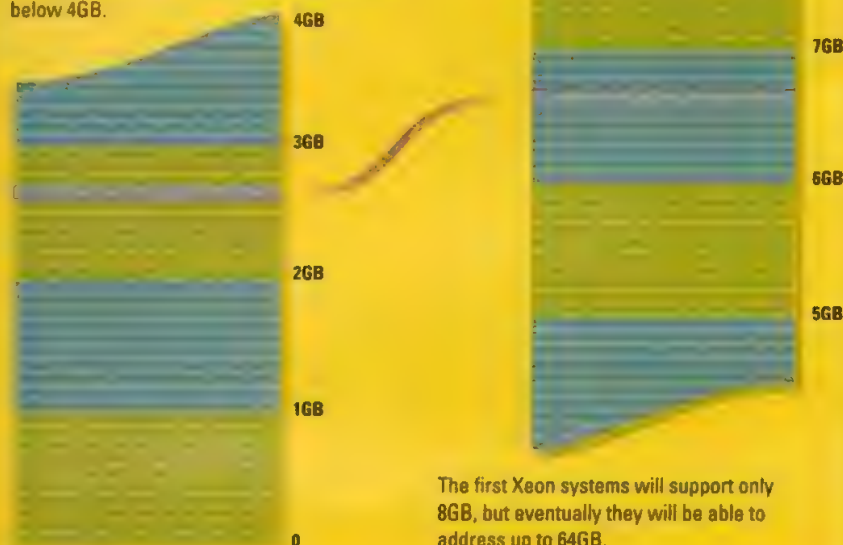
We were able to create and run simple scripts in testing without a hitch. This is an important addition, one that brings Win NT up to speed with Unix, which has always been highly scriptable. In many ways, COM makes Win NT scripting more powerful than Unix scripting, because it provides a standard way for system-level scripts to interact with programs without any source code access or reprogramming. This scripting capability was also in the Win NT 4 Option Pack, but it is now integrated into Win NT 5.

These additions help ensure that the new Win NT 5 has more power for distributed computing than previous versions. Though it lacks Unix's experience—and ultra-high-end clustering support, IS departments will likely feel more comfortable relying on the new Windows NT Server 5.0 Enterprise Edition for larger and more critical applications in the enterprises of the very near future than they have heretofore.—RVD

Extended Server Memory Architecture

Similar to the old Expanded Memory Specification of the 1980s, Extended Server Memory Architecture (ESMA) takes advantage of the Intel Xeon processor's 36-bit addressing capabilities to allow a program to swap memory above and below the 4GB memory limit.

Traditional 32-bit programs can't see memory above 4GB, so they need special hardware to switch in different banks of memory above and below 4GB.



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ADMINISTRATION

Although no two people readily agree on all of the components that make up a network's TCO, almost everyone agrees that one of the biggest costs is administration. Microsoft Windows NT 5.0, as we've seen in our testing of beta 2, helps you better administer your network. On the whole, we found that Win NT 5 can help you automate your upgrade, install software remotely, control what your users are doing, and keep the software on your client PCs uniform.

SERVER-SIDE ADMINISTRATION

Policies, or the ability to send updates and configure

You can use policies to control users' access to applications and even to the Windows utilities installed on their desktops.

desktops, are not new to Windows NT; in fact, most of the same policies have been around since Microsoft Windows for Workgroups. What's new to Windows NT 5 is the interface to access them. Windows NT 5 includes a new Group Policy Editor which allowed us to determine what applications a user could access and to control applications on the user desktop. We found it easy to remove the Run command and the Control Panel icon from every user's desktop.

First released in the Win NT 4 Option Pack, Windows Scripting Host let us create an automatic installation routine. We were able to use the scripting utility to walk through an installation of Microsoft Office and send the script, along with the files, to our client PCs. You can script any COM object, and you can use VBScript, JavaScript, or even PerlScript. Novell's ZENworks provides many of the same features and is included with NetWare 5.

Another important tool for network administrators is the ability to let users

move from PC to PC but keep their applications and data wherever they go. We set up roaming profiles for all our mobile workers. To do this, we had to create a new share and place in the directory tree. From there, everything we added to that share followed the user around to any PC. The personal information showed up based on the user's logon name and password.

All the features we mentioned above require that client PCs be running a Win-

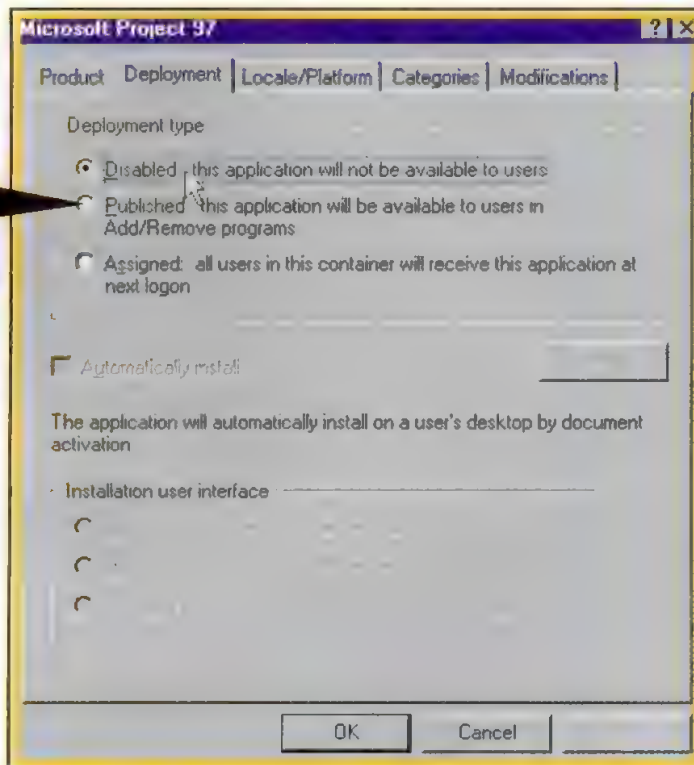
(Preboot Execution Environment). Otherwise, the new OS will be sent to the client PC when the user logs on to the Win NT network. Once the new OS is installed, you can use user or group policies to distribute applications and other updates.

CLIENT-SIDE ADMINISTRATION

Another important component to network TCO is the ability to control what software your users can install on their client PCs. The Windows Installer Service (WIS) is available for both Workstation and Win NT Server. Like the uninstaller utility in ZENworks, WIS let us keep track of all the software and registry settings on any Win NT 5 client or server PC. Whenever a user installed or deleted a program, we were able to replace the system with a pristine configuration.

WIS also lets you replace only the files that are missing from an application, and not the entire program. To test this feature, we deleted an important Microsoft Word DLL from the System subdirectory on our test PC. When we tried to launch Word, WIS automatically connected to the server and downloaded the missing file. A similar utility is also available in ZENworks. On the whole, Win NT 5 and ZENworks are comparable, but ZENworks includes remote control capabilities (Microsoft Windows NT Terminal Server is a separate product).

Using the benefits of Active Directory, you can assign policies to a number of individual computers, users, and groups. Although Windows NT 5 lacks the hardware and software inventory features found in products like Microsoft System Management Server and Intel LAN-Desk, what it does have is a built-in infrastructure for managing devices, applications, and other resources called Windows Management Instrumentation. This is a step in the right direction and should help reduce total cost of ownership.—SR



dows-network based OS and be connected to the Win NT network. Fortunately, Win NT 5 also includes a utility that will automatically install the Windows NT 5.0 Workstation OS on your client PCs. The remote installation server requires an existing IP network running DNS, Dynamic Host Configuration Protocol (DHCP), and the Active Directory service. Note that the remote installation service is not installed by default and you must add it to your server manually.

In order to install the OS on a PC without an existing Windows client, the new PC must support the DHCP PXE

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- 3-year limited warranty⁷



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Leasing price: \$111/month¹

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Options

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SECURITY

Right or wrong, Microsoft Windows NT has long been the whipping boy of the enterprise security community. In fact, security is second only to scalability in Unix proponents' criticism of Windows NT. But with the introduction of the Active Directory, Microsoft is taking the opportunity to revamp its security structure and not only tighten up the LAN but also put in place mechanisms that will allow the secure sharing of information well beyond it.

At the center of the new model is Kerberos, a protocol originally developed at MIT. Unlike in the system used by Windows NT 4.0, where it was a proprietary protocol, Kerberos lets users authenticate without sending their passwords over the wire or storing them on local machines. Instead, it lets end users acquire a unique key at log-on from the central security authority on the Domain Controller, called the Key Distribution Center, or KDC.

Then, when the client requests a service on the network, such as a file retrieval from a server, Kerberos connects with the KDC using this key. If the user is authenticated by the KDC, the KDC gives the client a ticket, which is then used to establish a connection to the specific service or resource. This key is cached on

the local machine, and if the user wants access to that service again later, it can be invoked from the cache within the time limit set for the key. Keys are typically good for 8 hours, and one of the main advantages of Kerberos is that if the client repeats a request for that service within that time frame there is no need to communicate with the KDC (see diagram below).

In short, the KDC, and therefore the Domain Controller on which it resides, have been saved a transaction, which reduces its load and makes it more scalable. In our labs, we verified that when a client repeated a request, the client did not need to go back to the KDC for a key reissue.

Of course, Kerberos has been around for a couple of years and is in use in the Unix world. Being well aware of this, Microsoft takes advantage of its standards-based nature to allow non-Windows Kerberos users to be authenticated against the Active Directory, making it easier for Win NT 5 to get a foothold in Unix strongholds. Also, extensions have been added to Kerberos to allow for the use of public keys through X.509 digital certificates, which in turn will lay the groundwork for the use of smart cards for authentication.

Digital certificates have even stronger implications for connecting external users, such as business partners or customers, via virtual private networks

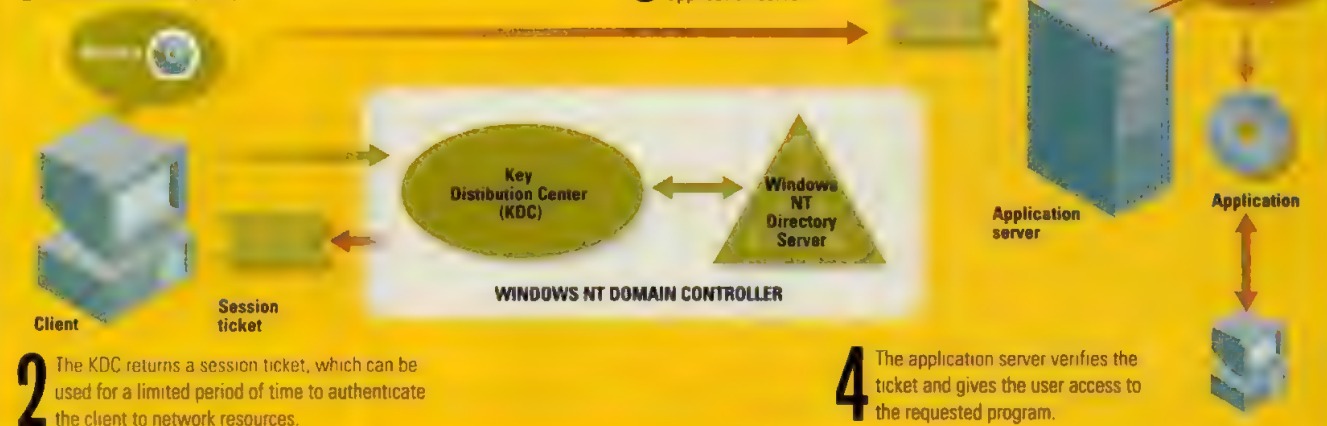
(VPNs). Through the use of certificates and evolving standards such as IPSec (IP Security Protocol—an encrypted, secure version of IP), Windows NT 5.0 will let users outside your LAN be strongly authenticated against the Active Directory by using certificates. You will then be able to pass secure, encrypted data across public networks such as the Internet. In case you aren't ready to make the jump to certificates, Microsoft is pragmatic about offering alternate VPN technologies. In fact, if you're currently using PPTP (Point-to-Point Tunneling Protocol) to connect users to the network, you can continue to do so or convert to either IPSec or Layer 2 Tunneling Protocol (L2TP), both native to Windows NT 5.0.

To improve the usability of VPN and remote access in larger installations, Microsoft has integrated the Connection Manager administration kit, which was originally released in the Win NT 4 Option Pack. In the lab, we used it to create a customized interface, including all applicable phone numbers to ISPs or a Remote Access Server (RAS), which we pushed to the end users' desktops to let them get connected more easily. By adopting a standards-based approach to authenticating, several choices for VPN technology, and administrator interface improvements, Microsoft will undoubtedly quiet some of its critics.—Kevin Young **PC**

Kerberos Support Win NT 5 lets systems on a network authenticate securely without circulating passwords.

1 The client makes a request to access a program
The client authenticates with the Windows NT Key Distribution Center (KDC)

3 The client then presents the session ticket to the application server.





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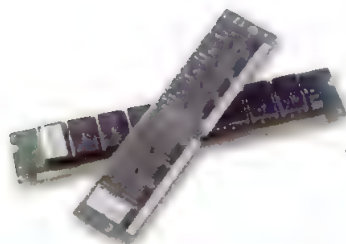
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\$219.96	\$109.98	\$59.98
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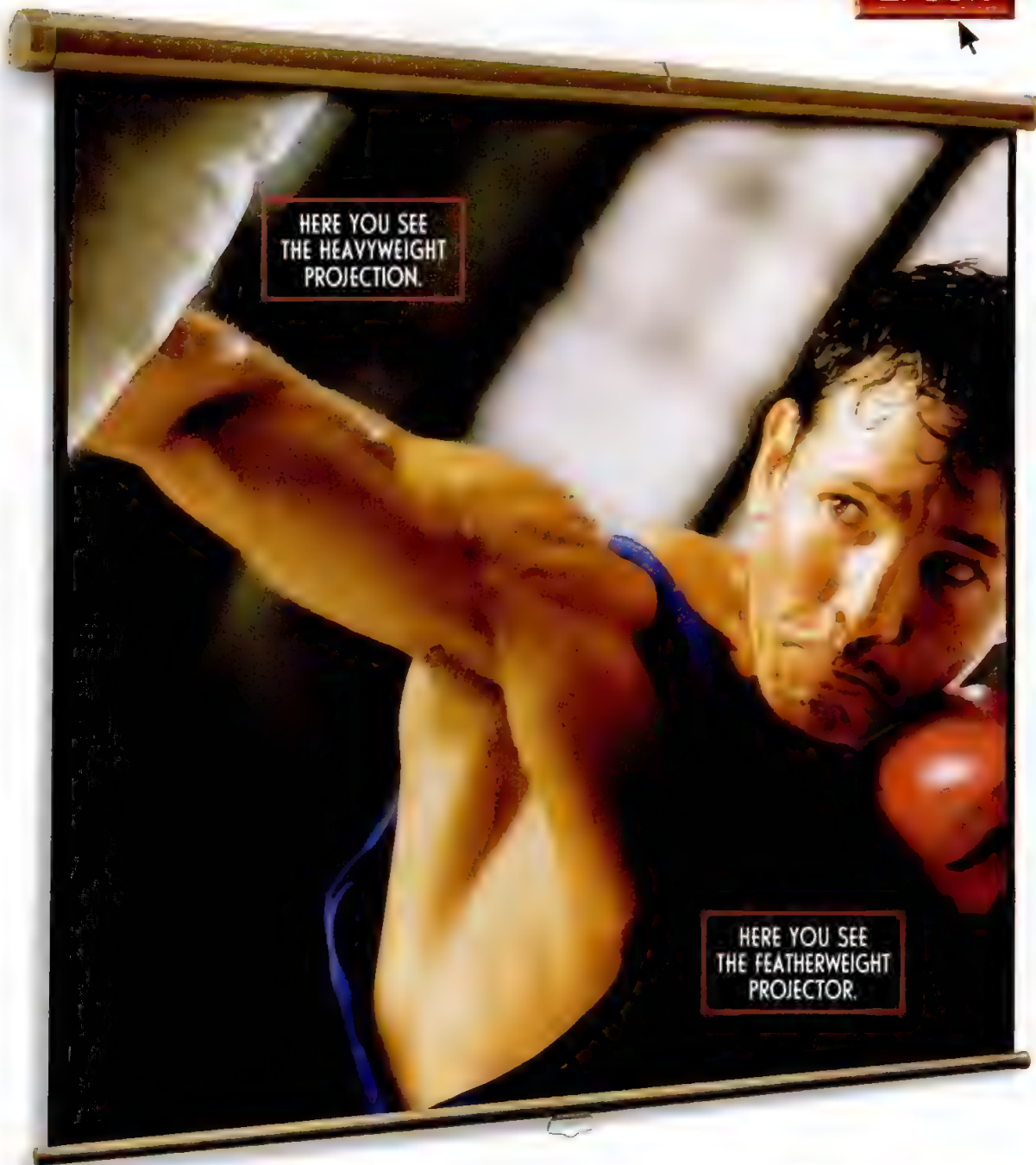
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We test 43 e-commerce sites, buying and returning goods, to tell you which ones should get your business.

By David Lidsky

Think about your most pleasant shopping experiences. What they most likely have in common is an attractive store design, a great selection of high-quality merchandise, fair prices, and customer service that connects with you and serves your needs.

The principles of good retailing don't change just because the dealer is selling on the Web. Nor should your expectations as a customer. We tested sites in eight of the hottest markets on the Web: books, flowers, hardware, music, software, and videos, as well as auctions and superstores. We scrutinized the core components of any commerce site: interface, navigation, integration of features, selection, pricing, product information, search engines, product comparison tools, personalization, the buying process, and returning goods. In the course of our review process, we found a good number of sites that are truly worthy of your business and are paragons for the future of retailing. Read our reviews with your credit card and your mouse within reach.

Web Superstores.....136	Hardware Shopping Agents148	Movie Shopping Agents153	Books.....156
Computer Hardware137	Computer Software153	Internet Florist vs. 1-800-Flowers.....155	Book Shopping Agents160
Editors' Choice137	Reel.com vs.155	Flower Shopping Agents155	Music.....160
Auction Sites.....140	Blockbuster On-Line153	Software Shopping Agents156	Music Shopping Agents161



Web superstores try to be the online version of real-world major department stores and warehouse clubs, offering a wide variety of merchandise in one place, often at very attractive prices.

Two of the four superstores we review here have membership fees that shoppers must pay to take advantage of special features and low-price guarantees. None of these stores can really compare with the best shopping experiences on the Web; their specialty sections are good but generally lack the selection and content available at sites devoted to specific markets. But at the two best sites, NetMarket and Shopping.com, you will definitely find low prices and at least serviceable interfaces for navigating their vast array of products. **By Sarah L. Roberts-Witt**

CyberShop

www.cybershop.com Even though CyberShop was one of the first online stores to be launched, its limited selection and high prices leave it behind its competition.

For one of our test products, the Brother Personal FAX-190, CyberShop returned the most expensive result—an astounding \$179.95 (we found it for \$129 at a Staples store). Another one, the Canon Elph Kit Camera, cost \$50 more than at any other superstore. And with only 40,000 products, CyberShop is dwarfed by the likes of NetMarket and Shopping.com, which have 800,000 and more than 2 million products, respectively. We also found that some merchandise was grouped oddly; for example, an Indoor Spacemaker Stereo Player by GE was in CyberShop's Outdoor Furniture section.

Small consolation, but at least CyberShop doesn't add a member-

ship fee to its relatively costly offerings. And CyberShop's Gifts Wrapped & Ready section—gift suggestions organized by price—is a nice touch. You can shop by department or brand, and special offers, featured products, new products, and seasonal promotions are prominently posted. CyberShop also boasts a frequent buyers' program similar to NetMarket's.

NetMarket



www.netmarket.com

Positively bursting with bargains, NetMarket, an everything-under-the-sun online bazaar, defines the Web superstore genre. Of the sites we reviewed, it is the only true full-service shopping source. You can shop without being a member at NetMarket, but by paying the \$59.95 annual fee you get access to its auction site, a flea market, its 30-day

low-price guarantee (with a 135 percent refund if you find a lower price anywhere), a frequent buyers' program, a gift finder, and more. NetMarket's membership is the most expensive among the sites we reviewed.

NetMarket offers a very intelligent process for selecting products. Once you find the type of product you want, you will usually be presented with a context-specific search page that lets you set price filters, manufacturer preferences, and other features. Once you narrow it down, you can compare products side by side.

Shopping.com returned lower prices in our tests, but NetMarket's weren't bad. The Brother Personal FAX-190 was \$120 (compared with \$129 at a Staples store), which was bested only by Shopping.com. And compact disk prices were just under \$12 for most selections, placing NetMarket within a few cents of Shopping.com and beating out online music retailer CDnow by almost \$2.00.

Shop4.com

www.shop4.com The least inviting superstore in our roundup, Shop4.com primarily offers a frustrating and somewhat dull shopping

experience. Its prices sit squarely in the middle of the sites we reviewed, although it has a 110 percent price guarantee program for members (\$49.95 per year). The site promises that it will soon include a Shop4 outlet store; a books, music, and videos section; and a program for goods that need to be assembled, such as furniture and exercise equipment. Until these features are implemented, you may want to spend your time and money elsewhere.

Shopping.com

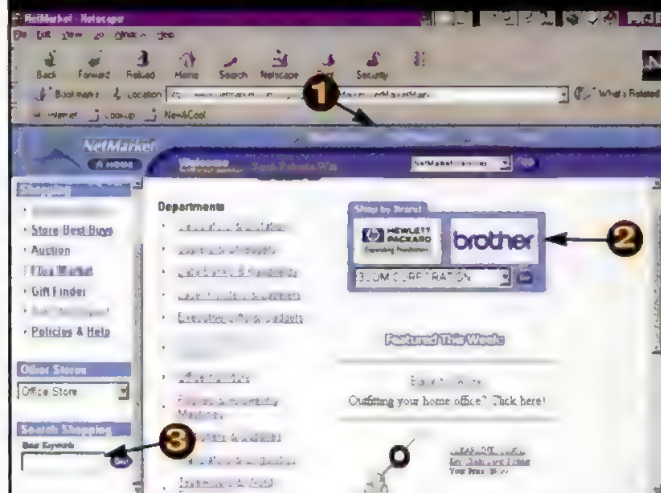
www.shopping.com If you're a bargain hunter, your pulse will undoubtedly quicken when you encounter Shopping.com's prices. We found, for example, the Brother Personal FAX-190 for \$79.97 including shipping and handling—the lowest by \$40 of all the stores' prices in our roundup. Without some of the smooth site navigation and membership features that NetMarket offers, though, Shopping.com has price-club prices without the price-club accoutrements we like at NetMarket.

Unique in this field is the size of Shopping.com's inventory—more than 2 million products. But with that many products, the site's lack of a

ANATOMY: WEB SUPERSTORE

1 NetMarket is a shopping club, where you get NetMarket cash with each purchase. You can redeem it later for more merchandise. Find out how much you have available in My Passport. 2 You can easily find products from your favorite manufacturer using the Shop by Brand

brand feature. Or you can browse through one of the departments, which are straightforward and jammed with items. 3 Easy access to NetMarket's powerful search engine is another smart and utilitarian element of the store's design.



global search engine makes finding the deals challenging. Each section and subsection has a search engine, but to find what you're looking for, you still have to get to the right place. To find a telephone answering machine (\$39.93 here versus \$43.58 at NetMarket), we correctly guessed

to choose the Consumer Electronics section, then the Telephone section, and lastly the Answering Machines section. Shopping.com says a global search engine should be in place by the end of the year. And once this happens, the other superstores had better watch their backs.



When Web sites hawking such decidedly low-tech items as John Grisham novels can be high-tech wonders, online computer hardware shops selling PCs and peripherals must be mesmerizing, right?

Much to our surprise, nothing could be farther from the truth.

While some of the stores we visited, such as NECX, had the advanced comparison tools and search capabilities that we have come to expect, as a group these sites have a ways to go. None of them will cause a fundamental shift in mass consumer buying habits, à la Amazon.com. Often, you're still better off using the Web for research and then picking up the phone or going to the store to buy. Any of the stores in this roundup could have the best price on a particular item, so if you have the time, popping into a few sites or trying a shopping agent could be well worthwhile. **By Josh Taylor**

BuyComp

www.buycomp.com BuyComp clearly does its pricing homework. On nearly every item we checked, it had the best prices of any site in this roundup—in some cases by a wide margin. The most eye-popping result

we found was the Kodak DC220 Digital Zoom Camera for \$576.98; NECX sold the same item for \$699.95, while the rest of the sites that carried it ranged from \$769.95 to \$799.99.

Unfortunately, BuyComp's shipping rates are among the highest of

Our Contributors: Alan Cohen, Jill Leger, Eyal Rabinovitch, and Sarah L. Roberts-Witt are freelance writers. John Garriss is a leader at Scient and a frequent contributor to *PC Magazine*. Josh Taylor is a partner in The Reflector Group, a Web consulting firm in New York City. Doug Belzer is a staff editor of *PC Magazine*, and Emily Cohen is an editorial researcher. Jay Munro was the project leader, and David Uidsky was the associate editor in charge of this story.

EDITORS' CHOICE



After rigorous testing—buying products all day is tough work—we concluded that these sites stand out as the best the Web has to offer in each market. Charge!

• Web superstores: NetMarket

The only Web superstore with a well-designed site, excellent search capabilities, and good bargains (especially notable because some of its competitors can't claim even one of those features), NetMarket should definitely be on your shopping list.



• Computer hardware: NECX

Well-designed and offering great prices, NECX is the site you want to visit when it's time to pick up a scanner or a new PC. It gives you a fountainhead of information—from name-brand reviews to competitors' prices—to help you choose what to buy.



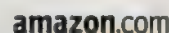
• Computer software: Chumbo.com

Its customer support and stellar mechanisms for customer feedback on products make Chumbo.com stand out. Find out whether that new program's a dud—not just before you've removed the shrinkwrap, but even before you've plunked down your credit card.



• Books: Amazon.com

As much a community of book lovers as a bookstore, Amazon.com delivers one of the most pleasant Web shopping experiences, period. Read a review, write one, get suggestions for what to read next from fellow shoppers, and get addicted to buying books this way.



• Music: CDnow

For music buying with a personal touch, as well as great prices and selection, CDnow (and in particular, its MyCDnow) is the place to be. Keep a list of favorite artists, create your own personal gift registry, and teach the recommendation software your tastes.



this roundup—surpassed only by CDW's—as if to compensate for its prices in a fashion (shipping charges are weight-based). Typically, the price differences weren't dramatic: For example, the Epson Stylus Color 850 was \$11 cheaper at BuyComp than at NECX, but once you added the shipping charges, the price difference was less than \$6.

BuyComp is not our Editors' Choice, though, because we found its site lacking in many areas. It is missing the superior search functionality of NECX and PC Connection; it doesn't provide as many product

descriptions and photographs as we would have liked to see; and on the whole, its site performance is relatively sluggish over a dial-up connection. But if you're determined to get the best price even in view of these flaws, you would do well to visit BuyComp's site before any purchase.

CDW

www.cdw.com Though CDW offers a feature set comparable to that of NECX, our Editors' Choice, its higher-than-average prices prevent us from recommending CDW as your

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- 30-Day ConnectDirect Internet Service
- Iomega Zip 100MB Internal Drive
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- Epson Stylus 600 Color Printer[†]
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- 1-Year At-home® Service

\$2199

Personal Lease®: \$83/Mo., 36 Mos.

Order Code #501014

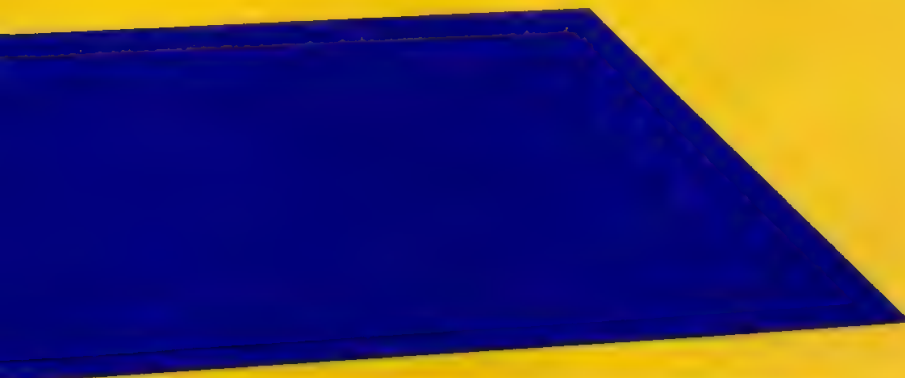


For faster service, please have your order code and keycode available when calling.

*Personal leasing arranged by Dell Financial Services L.P., an independent entity, to qualified customers; amount of monthly payment which may vary (for example, Hartford City, IN sales tax @ \$4.69/month); shipping cost due with first payment; no security deposit required.

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PENTIUM II PROCESSOR AT 450MHz**

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- NEW 3Com USR V.90[®] PCI WinModem
- 30-Day ConnectDirect Internet Service
- MS Home Essentials 98 with Money 98
- MS Windows 98/IntelliMouse
- Dell Comfort Key Keyboard
- **HP[®] 722C DeskJet[®] Color Printer[†]**
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- **1-Year At-home[®] Service**

\$3299

Personal Lease[®]: \$123/Mo., 36 Mos.
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- ATI 8MB 3D AGP Graphics
- 40X Max[™] Variable CD-ROM Drive
- Yamaha XG 64V Wavetable Sound
- NEW harman/kardon HK-195 Speakers
- NEW 3Com USR V.90[®] PCI WinModem
- 30-Day ConnectDirect Internet Service
- MS Home Essentials 98 with Money 98; McAfee VirusScan
- MS Windows 98
- Dell Comfort Key Keyboard
- NEW Logitech First Mouse+ (PS/2V)
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final purchasing destination. For example, a 12MB Creative Labs 3D Blaster Voodoo2 graphics accelerator was \$249.99, more expensive than in any other store in this roundup except CompUSA Online. And the Kodak DC220 Digital Zoom Camera was \$799—\$100 more expensive than at NECX and \$200 more than at BuyComp.

CDW has some notable features, including a nifty Buyer's Alert which sends shoppers an e-mail when a previously selected item hits a specified target price. The CDW Compare feature, easily accessed from the home page, allows for swift product match-ups in a range of categories, including desktops, notebooks, printers, and scanners.

The site does have some shortcomings in addition to price, however. Although we were happy to have access to product reviews, CDW's current system falls short. More often than not, searching for reviews on a specific product (retrieved through ZDNet) yielded a

list that failed to turn up any germane hits. And while we appreciated CDW's Quick Shipping Calculator, which showed our shipping costs before we checked out (via a link on the Shopping Cart page), it only exposed that the site's rates were no bargain.

CompUSA Online

www.compusa.com Real-world stores are sometimes wary of having a Web presence for fear of cannibalizing their primary business. CompUSA likely won't have to worry about that, because the site's design is nothing flashy and its search functionality is mediocre at best. But the real head-scratcher is its pricing scheme: For many items, we found online prices significantly higher than those paid by customers who walk into a CompUSA store or order by phone.

We found a 17-inch monitor (the ViewSonic GS771) that cost \$91.96 more for online shoppers: \$499.95, as opposed to \$407.99 for walk-in and phone customers. A 3-D graph-

ics accelerator (the 12MB Creative Labs 3D Blaster Voodoo2 card) went for a \$50 premium online: \$299.95 versus \$249.99.

CompUSA Online does offer a low-price guarantee, so savvy shoppers should be able to get the difference back with a phone call to the sales department. But since even CompUSA Online's cheapest prices are generally higher than those of the other sites in this roundup, you're probably better off making your purchases elsewhere for now.

Cyberian Outpost

www.cyberianoutpost.com Because it was one of the few companies in this roundup built from the ground up for the Web, you might expect Cyberian Outpost to be among the most technically advanced sites in its field. Given that, its basic failures in so many areas are surprising.

An overreliance on comic book-style graphics makes Cyberian Outpost extremely sluggish to visit—a failure compounded by the numerous

extra clicks required to navigate the site. Cyberian Outpost also ranks among the least customer-friendly of sites: Purchases of more than \$1,000 require buyers to fax or e-mail personal identification. Return customers are forced to reenter all of their personal information whenever they make new purchases.

Fortunately, there is one area where Cyberian Outpost does match up well: value. The site had some of the best prices in this roundup, though for any given item, comparison shopping is always a good idea. For example, Cyberian Outpost had a great deal on the 12MB Creative Labs 3D Blaster Voodoo2 graphics card (\$192.95), but its price on a ViewSonic 17-inch monitor was decidedly average, at \$379.95 (BuyComp had it for \$50 less). Surprisingly, Cyberian Outpost was also among the most competitive in shipping costs, an area where steep-discount shops (such as BuyComp and NECX) often try to make back some of their money. Another nice

AUCTION SITES

Web auctions are not only sources of good, sometimes great, deals. You'll also find they're fun. We focused on finding computer hardware at these six sites. *By Eyal Rabinovitch*

THE GOODS

THE SITE

THE PROCESS

THE DEALS

AUCTION UNIVERSE www.auctionuniverse.com

★★★★★

Limited selection of computers. All products are sold by outside companies or individuals. Many specs are incomplete

★★★★★

Almost every page has links to all the other categories. Search by keyword, product, and proximity of the auction's closing time

★★★★★

For \$19.95, all credit card transactions guaranteed. Ratings of buyers and sellers based on feedback. You can e-mail sellers and bid by proxy. Site will e-mail you if you're being outbid

★★★★★

The site is average compared with others in the roundup. We found a new generic 300-MHz desktop for \$620

eBAY www.ebay.com

★★★★★

The most extensive selection in the roundup. All products are sold by outside companies or individuals

★★★★★

Categories are accessible from most pages. Shoppers can see which auctions are about to end

★★★★★

The site maintains ratings of all buyers and sellers. Shoppers can e-mail the vendors and previous bidders. All bids are automatically made through proxies

★★★★★

The best deals here. We found a 266-MHz Compaq Presario 1625 notebook for \$1,075. A refurbished one at CDW was \$1,574.86

FIRST AUCTION www.firstauction.com

★★★★★

The computer hardware inventory is average. Most are new products. Site provides thorough descriptions

★★★

The site is well organized, but shoppers must return to the home page to switch between auction categories. No in-site search engine

★★★★★

30-minute Flash Auctions have many deals. Regular auctions let you see how many other bids have been made on the bid page. No proxy bidding

★★★★★

The site has deals on no-name systems. In other categories, deals were average

ONSALE www.onsale.com

★★★★★

Good selection. Most are factory-direct, new and refurbished products. Good product descriptions

★★★★★

The site is easy to navigate, because the major areas are accessible from each page. No in-site search engine

★★★★★

Proxy bidding is available. Shoppers can see which other bidders are using proxies. Shoppers can retract bids within 15 minutes, and can e-mail sellers directly

★★★★★

Second only to eBay in terms of great deals, this site offers more new products sold directly from the manufacturers

SURPLUSAUCTION www.surplusauction.com

★★★★★

Good selection of computer products from Egghead.com. Top-name vendor suppliers, good product descriptions

★★★

The site has good navigation. Links to each major area remain on every page. The product listing page is inadequate

★★★★★

The site offers no proxy bidding and no way to contact the vendor. HyperAuctions (hour-long auctions) and huge-quantity MegaAuctions are pluses

★★★★★

Occasional steals, many under market value. We found an AST Ascenta M5230X notebook for \$1,281—about \$750 less than list

WEBAUCTION www.webauction.com

★★★★★

Mostly new, name-brand products from Micro Warehouse. Good selection and detailed product descriptions

★

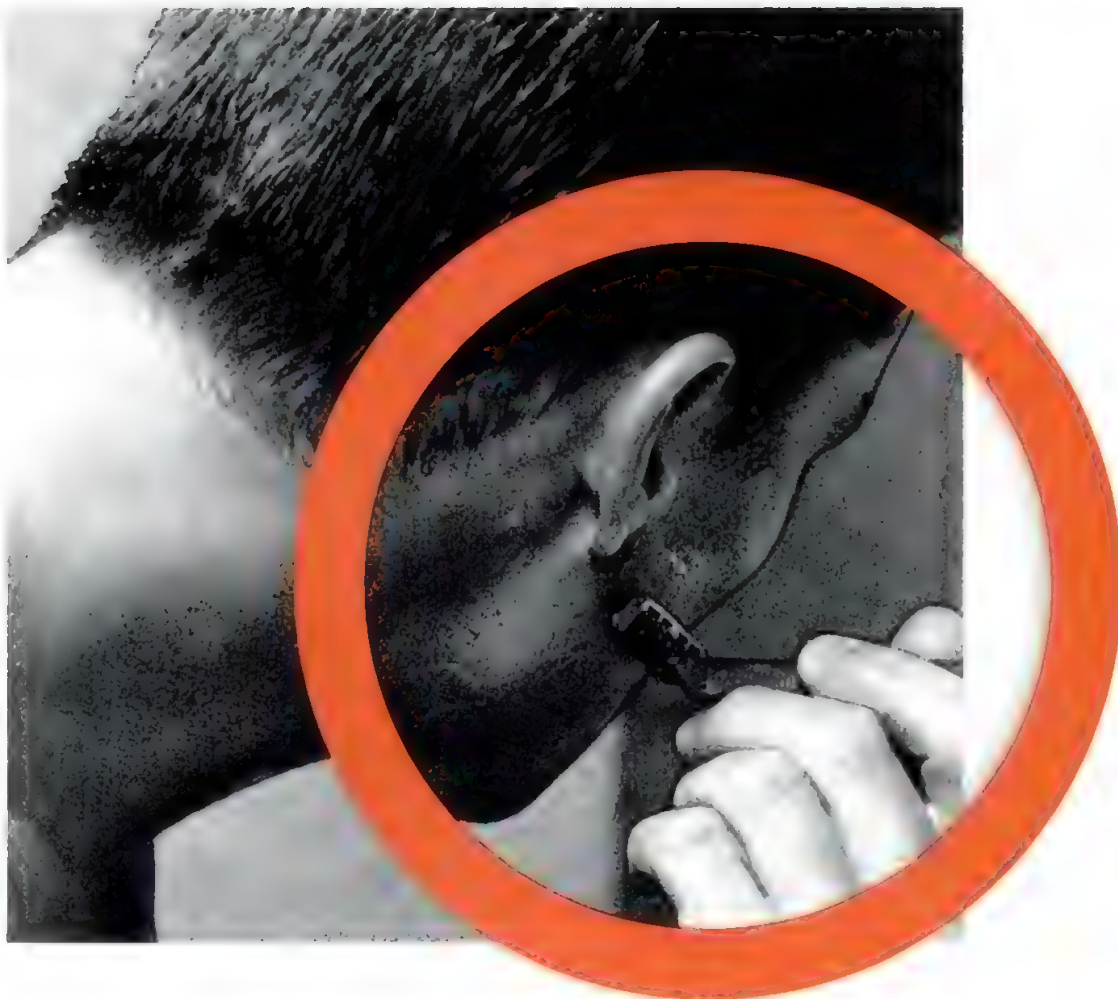
The site has poor navigation. Shoppers must always go back to the home page to move around the site. No search engine

★★★★★

The easiest bidding page in the roundup, with easy drop-down menus. Auctions last 24 hours, hour-long auctions take place four times a day. No way to retract a bid

★★

The site rarely has great deals but usually sells every product for below market price.



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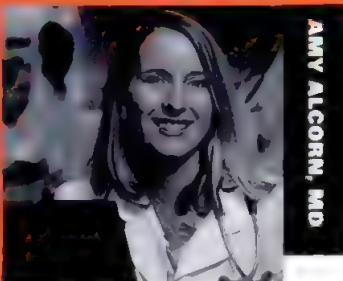
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When using TREK² on the plane, try not to laugh when the 14.1 inch monitor dwarfs the guy's next to you. It's just not a very nice thing to do.

Pack light — there's nothing worse than a carry-on that leaves divots in your shoulder, which is why the TREK² is as thin as 1.7" and as light as 7.2 lbs.

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"The TransPort TREK²
is the Fastest Budget
Notebook We've Run
Through Our Mill."
—PC World, August 11,
"Best Buy," April '98

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and those who do not
travel, read only a page.
—William Goins, III



TREK² 233



TREK² 233



TREK² 266



New!
TREK² 300

Now Featuring
Brilliant
14.1" Display!

Model Name	TREK ² 233	TREK ² 233	TREK ² 266	TREK ² 300
Processor	Intel® Pentium® II processor 233MHz	Intel Pentium II processor 233MHz	Intel Pentium II processor 266MHz	Intel Pentium II processor 300MHz
Cache	512KB L2 pipeline burst cache	512KB L2 pipeline burst cache	512KB L2 pipeline burst cache	512KB L2 pipeline burst cache
RAM	32MB SDRAM	64MB SDRAM	64MB SDRAM	64MB SDRAM
Hard Drive	3.2GB hard drive*	3.2GB hard drive (removable)*	3.2GB hard drive (removable)*	3.2GB hard drive (removable)*
Monitor	12.1" SVGA TFT display	14.1" XGA TFT display	14.1" XGA TFT display	14.1" XGA TFT display
Extra Storage	3.5" floppy disk drive	3.5" floppy disk drive (dedicated bay)	3.5" floppy disk drive (dedicated bay)	3.5" floppy disk drive (dedicated bay)
CD-ROM	24X CD-ROM drive	24X CD-ROM drive (dedicated bay)	24X CD-ROM drive (dedicated bay)	24X CD-ROM drive (dedicated bay)
Graphics	4MB AGP graphics accelerator	4MB AGP graphics accelerator	4MB AGP graphics accelerator	4MB AGP graphics accelerator
Sound System	Built-in stereo speakers & microphone	Built-in stereo speakers & microphone	Built-in stereo speakers & microphone	Built-in stereo speakers & microphone
Warranty	5-year/3-year Micron limited warranty	5-year/3-year Micron limited warranty	5-year/3-year Micron limited warranty	5-year/3-year Micron limited warranty
Software Included	Microsoft® Windows® 98 System Wizard Mobile Client™™ Norton AntiVirus	Microsoft Windows 98 Microsoft Office Small Business Edition System Wizard Mobile Client™™ Norton AntiVirus	Microsoft Windows 98 Microsoft Office Small Business Edition System Wizard Mobile Client™™ Norton AntiVirus	Microsoft Windows 98 Microsoft Office Small Business Edition System Wizard Mobile Client™™ Norton AntiVirus
Also Includes:	Zoomed Video capable Li-Ion battery (dedicated bay) Microphone, stereo line-in/out jacks Touchpad pointing device CardBus ready S-Video & NTSC out; MPEG compatible WaveTable/3D Positional Sound 2-way fast infrared port 2 Type II/1 Type III PCMCIA slots 2-USB, parallel, serial, VGA, PS/2 ports	Zoomed Video capable Li-Ion battery (dedicated bay) Microphone, stereo line-in/out jacks Touchpad pointing device CardBus ready S-Video & NTSC out; MPEG compatible WaveTable/3D Positional Sound 2-way fast infrared port 2 Type II/1 Type III PCMCIA slots 2-USB, parallel, serial, VGA, PS/2 ports	Zoomed Video capable Li-Ion battery (dedicated bay) Microphone, stereo line-in/out jacks Touchpad pointing device CardBus ready S-Video & NTSC out; MPEG compatible WaveTable/3D Positional Sound 2-way fast infrared port 2 Type II/1 Type III PCMCIA slots 2-USB, parallel, serial, VGA, PS/2 ports	Zoomed Video capable Li-Ion battery (dedicated bay) Microphone, stereo line-in/out jacks Touchpad pointing device CardBus ready S-Video & NTSC out; MPEG compatible WaveTable/3D Positional Sound 2-way fast infrared port 2 Type II/1 Type III PCMCIA slots 2-USB, parallel, serial, VGA, PS/2 ports

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Lease, 36 mos.**

\$2,799

^{\$98/mo.}

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4

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— RALPH WALDO EMERSON

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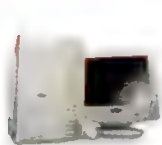
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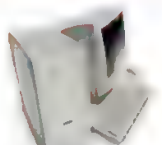
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Millennia C300



Millennia 350



Millennia 400



New! Millennia 450



New! Millennia 450 MAX

Model Name	Millennia C300	Millennia 350	Millennia 400	New! Millennia 450	New! Millennia 450 MAX
Processor	Intel® Celeron® processor 300MHz	Intel Pentium® II processor 350MHz	Intel Pentium II processor 400MHz	Intel Pentium II processor 450MHz	Intel Pentium II processor 450MHz
Cache	128KB internal L2 cache	512KB internal L2 cache	512KB internal L2 cache	512KB internal L2 cache	512KB internal L2 cache
RAM	32MB SDRAM	64MB 100MHz SDRAM	64MB 100MHz SDRAM	64MB 100MHz SDRAM	128MB 100MHz SDRAM
Hard Drive	4.3GB Ultra ATA hard drive*	10GB Ultra ATA hard drive*	10GB Ultra ATA hard drive*	10GB Ultra ATA hard drive*	14.4GB 7200 RPM Ultra ATA hard drive*
Monitor	15" Micron 500Vx monitor (13.8" display)	17" Micron 700Vx monitor (15.9" display)	17" Micron 700Vx monitor (15.9" display)	17" Micron 700Vx monitor (15.9" display)	19" Micron 900Lx monitor (18" display)
DVD/CD-ROM	32X max speed CD-ROM drive	32X max speed CD-ROM drive	32X max speed CD-ROM drive	32X max speed CD-ROM drive	DVD-ROM drive and decoder card***
Modem	3Com/U.S. Robotics 56K WinModem**	3Com/U.S. Robotics 56K WinModem**	3Com/U.S. Robotics 56K WinModem**	3Com/U.S. Robotics 56K WinModem**	3Com/U.S. Robotics 56K WinModem**
Graphics	nVidia Riva 128, 4MB SGRAM 3D AGP graphics	nVidia Riva 128, 8MB SGRAM 3D AGP graphics	nVidia Riva 128, 8MB SGRAM 3D AGP graphics	nVidia Riva 128, 8MB SGRAM 3D AGP graphics	Real 3D Starfighter 1740, 8MB AGP graphics
Sound System	PCI 64-voice Wavetable sound	PCI 64-voice Wavetable sound	PCI 64-voice Wavetable sound	PCI 64-voice Wavetable sound	PCI 64-voice Wavetable sound
Warranty	5-year/3-year Micron Power™ limited warranty	5-year/3-year Micron Power limited warranty	5-year/3-year Micron Power limited warranty	5-year/3-year Micron Power limited warranty	5-year/3-year Micron Power limited warranty
Software Included	Microsoft® Windows® 98 Microsoft Home Essentials Microsoft Power Pak Norton AntiVirus	Microsoft Windows 98 Microsoft Office 97 Small Business Edition Norton AntiVirus	Microsoft Windows 98 Microsoft Office 97 Small Business Edition Norton AntiVirus	Microsoft Windows 98 Microsoft Office 97 Small Business Edition Norton AntiVirus	Microsoft Windows 98 Microsoft Office 97 Small Business Edition Norton AntiVirus
Also Includes:	New MicroTower™ case Advent AV009 stereo speakers 104-key enhanced keyboard Microsoft IntelliMouse™ 3.5" floppy drive	New MicroTower case Advent AV009 stereo speakers 104-key enhanced keyboard Microsoft IntelliMouse 3.5" floppy drive	New MicroTower case Advent AV009 stereo speakers 104-key enhanced keyboard Microsoft IntelliMouse 3.5" floppy drive	New MicroTower case Advent AV009 stereo speakers 104-key enhanced keyboard Microsoft IntelliMouse 3.5" floppy drive	Micron MiniTower case Monsoon MM1000 flat panel speakers 100MB Iomega Zip Drive 104-key enhanced keyboard Microsoft IntelliMouse 3.5" floppy drive

Price	\$1,199 '42/mo. TechRefresh Bus. Lease, 36 mos.**	\$1,649 '58/mo. TechRefresh Bus. Lease, 36 mos.**	\$1,749 '61/mo. TechRefresh Bus. Lease, 36 mos.**	\$1,799 '63/mo. TechRefresh Bus. Lease, 36 mos.** <i>New Low Price!</i>	\$2,899 '101/mo. TechRefresh Bus. Lease, 36 mos.** <i>New Low Price!</i>
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Upgrade to:	8.4GB Ultra ATA hard drive 17" Micron 700Vx monitor (15.9" display) 100MB Iomega Zip drive	13.6GB Ultra ATA hard drive 19" Micron 900Lx monitor (18" display) 100MB Iomega Zip drive	13.6GB Ultra ATA hard drive 19" Micron 900Lx monitor (18" display) 100MB Iomega Zip drive	13.6GB Ultra ATA hard drive 19" Micron 900Lx monitor (18" display) 100MB Iomega Zip drive	256MB 100MHz SDRAM Microsoft Natural Keyboard Elite
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Price	\$1,426 '50/mo. TechRefresh Bus. Lease, 36 mos.**	\$1,996 '70/mo. TechRefresh Bus. Lease, 36 mos.**	\$2,096 '73/mo. TechRefresh Bus. Lease, 36 mos.**	\$2,196 '77/mo. TechRefresh Bus. Lease, 36 mos.** <i>New Low Price!</i>	\$3,214 '112/mo. TechRefresh Bus. Lease, 36 mos.** <i>New Low Price!</i>
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— PC Computing
April 1998

If you're looking for complete network solutions, or simply need to upgrade your current network, consider Micron™ ClientPro® managed PCs and Micron NetFRAME® servers. Network-ready right out of the box, packing the power of the Intel® Pentium® II processor 450MHz, and built on industry standards, the ClientPro effortlessly puts more manageable power in your office. And if you're looking for a reliable and expandable server, it would be tough to beat Micron's NetFRAME servers running with the powerful new Intel Pentium II Xeon™ processor.

"MICRON'S DUAL-PROCESSOR... SERVER RUNS FULL SPEED AHEAD."

— PC Computing A-List Editors' Choice



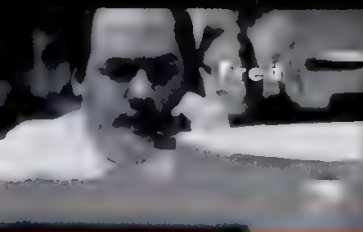
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Introducing the New Micron NetFRAME 6200



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you're starting to scratch the surface. Let's face it, when you're crawling around under someone's desk in a jungle of twisted cables because they want to see the dancing baby and you're the only one in the office that understands that "hot-swappable hard-drives" aren't something dirty, the last thing you need is a server that's anything but flawless.



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64-voice PCI WaveTable sound
3Com 3C905 WOL 10/100 network card
5-year/3-year Micron Power™ limited warranty

Intel LANDesk® Client Manager available
Microsoft® Windows NT® Workstation 4.0®
Norton AntiVirus

SMART II hard drive monitoring
Chassis intrusion detection
Fan, temperature, and voltage problem reporting
Virus detection reporting
Remote Wake Up capability
New MicroTower case
3.5" floppy drive
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Microsoft IntelliMouse®

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Diamond Viper 330 nVidia, 4MB AGP video
64-voice PCI WaveTable sound
3Com 3C905 WOL 10/100 network card
5-year/3-year Micron Power limited warranty

Intel LANDesk Client Manager available
Microsoft Windows NT Workstation 4.0®
Norton AntiVirus

SMART II hard drive monitoring
Chassis intrusion detection
Fan, temperature, and voltage problem reporting
Virus detection reporting
Remote Wake Up capability
MiniTower case
3.5" floppy drive
104-key enhanced keyboard
Microsoft IntelliMouse

\$2,099 ^{\$73/mo.}
TechRefresh Bus.
Lease, 36 mos.



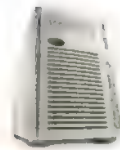
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Emergency Management Port Console
Microsoft Windows NT Server 4.0 (10-user license)

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NECX



www.necx.com As one of the best-designed sites in this roundup, with some of the lowest prices for PCs and hardware on the Web, NECX beats out the competition because of its all-around excellence. BuyComp typically has slightly better pricing, and CDW and PC Connection come close in features, but NECX offers the best total shopping experience.

NECX's Spec Search is the best we have seen. The JavaScript-based tool (there's a straight HTML version too) lets shoppers search on such basic criteria as price and manufacturer, as well as within several category-specific areas, including texturing mode, for graphic cards, and refresh rate, for monitors.

NECX shoppers are treated to a

large library of media reviews (from sources including *PC Magazine*, CNET, and even *Fortune*), and it's the only site we looked at that posted customer feedback. Shipping charges are prominently displayed directly on product detail pages.

Another interesting feature available on many items is a Compare Prices button. Click on it and a pop-up window shows you prices for the same item at several other online stores, including CDW and CompUSA Online.

NECX does have a few inconveniences. Its return period is only 24 days, as opposed to 30 days, the standard for the rest of the sites in this roundup. And if you lose your username or password, you have to call to get it instead of the more Internet-friendly option of requesting it via e-mail. But NECX is the rare site in this roundup that helps you find what you want and then gives you the product at a good price.



HARDWARE

Finding the exact PC you want at a good price can be difficult when shopping on the Web because of the large number of sellers. A shopping agent can help. It will query a number of stores on the Web, much like a search engine, and bring back returns meeting your criteria. You can then go directly to the site that has exactly what you want or the best price to buy the item. Some hardware agents also include comparison

tools to help you sort through features and help you choose what's best for you.

When You Don't Know What You Want: Check out ZDNet's **computer-shopper.com** (www.computershopper.com) if you're not sure where to begin. It offers an online checklist that guides you through the entire purchasing process. First-time buyers can simply answer a few nontechnical questions, or they can check off specific system components. The site also displays feature comparisons and links to ZD reviews (including *PC Magazine*).

KillerApp (www.killerapp.com) has an interface that makes it easy to find a PC or other hardware based on specific criteria. As you input your requirements (such as RAM amount), the list of matching products automatically changes.

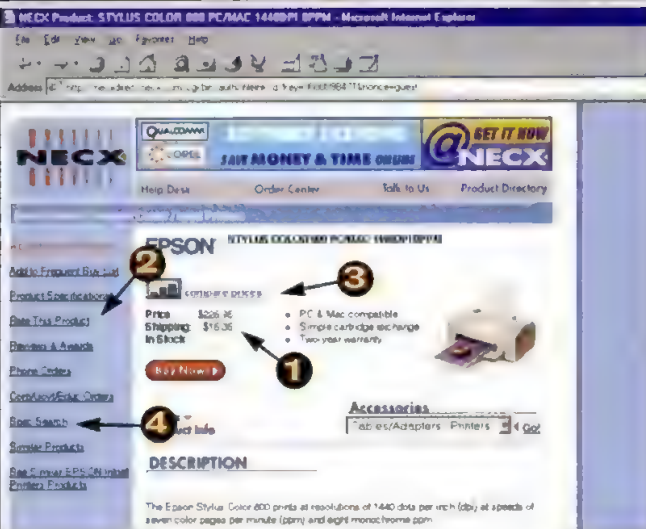
CNET's **Shopper.com** (www.shopper.com) is also a valuable resource. It lets you compare systems based on simple criteria (such as performance and price), and it offers links to CNET's product reviews.

When You're Looking for a Deal: If you're willing to do some work yourself, **RoboShopper** (www.roboshopper.com) is the way to go. This frames-based site lets you quickly run searches directly at all of its partner retail sites, simply by selecting a drop-down menu item. Since you're directly linked into those Web sites, it's easy to get all the price and configuration information you need from a variety of retailers.

Tools to Take Home: RoboShopper is the place to go for complex purchases, and KillerApp wins for all other buys.—John Garri

ANATOMY: HARDWARE STORE

- 1 Find shipping charges without leaving the item's page.
- 2 Hate your new printer? Warn off potential customers. Love it? You can post that opinion too, but who takes the time to say something nice?
- 3 Price comparisons let you know how NECX's price stacks up against other stores. Hint: NECX normally wins.
- 4 Try a detailed search, which lets you filter through a variety of criteria.



PC Connection

www.pcconnection.com Just as BuyComp stands out for delivering low prices, PC Connection shines solely for its excellent site design. But its higher prices make this, like CDW, a site to check out primarily for its wealth of information and search capabilities.

PC Connection's Feature Search function is surpassed only by NECX's in breadth of query options. The site's Service Desk is also top-notch, offering both one-on-one assistance via e-mail and a searchable knowledge base.

PC Connection has a popular catalog, and although its site is well done, the company seems to prefer that you shop the traditional way. Like other sites, PC Connection offers visitors the chance to subscribe to an online newsletter containing sales and new-product announcements, but you can get the e-mail only if you also request a snail-mail catalog.

And though we were impressed by overnight shipping costs that began at \$5.95, we wished we had the chance to specify UPS Ground for our larger orders. Instead, you need to call before placing an order if you want to choose an option other than

Airborne Express next-day delivery—at which point you might as well just place a phone order.

The PC Zone

www.pczone.com If you receive The PC Zone's catalog in the mail, then you already have a pretty good idea of what the Web site looks like. Unfortunately, The PC Zone has been slower in embracing the Web than some of its competitors (such as PC Connection). Apart from more detailed product specs and primitive search functionality, The PC Zone's site is not much more than an HTML version of its mail catalog. Ironically, by resisting an all-out online effort, the company may actually be doing its customers a service. Telephone customers of The PC Zone are often able to negotiate better-than-advertised prices, whereas Web site pricing tends to be written in stone.

The PC Zone also makes an occasional pricing gaffe: One page listed the Epson Stylus Color 800 printer for \$249.98, while another showed it selling for \$173. When we tried ordering the item, we were offered the \$173 price without a problem, but you would do well to pay close attention.

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The sites we review all give you a lot of background information to help you feel confident about the purchases you make. All the sites offer comparable pricing; you may find variances from one site to another on individual items, but on the whole they are competitive. A shopping agent may help you find which is lowest for the software you want. **By John Garri**

Beyond.com

www.beyond.com An easy-to-use site for finding the software you want, making your purchase, and tracking your order through final delivery, Beyond.com (formerly software.net), has a lot going for it. The site's lack of objective product reviews and its predominant focus on commercial software put Beyond.com just behind Chumbo.com.

At Beyond.com, you will find the best search facility of all the sites we reviewed. Key word-based searches usually return the products you want; they return surprisingly accurate "best matches" along with lists of "related matches." You can also narrow your search by specifying software publisher, category, operating system, and media type.

As with most of the sites we tested, the product information varies, but you usually get at least a high-level overview and system requirements. Unlike at Chumbo.com, you

don't get more objective pieces of information to help with your purchase decision. The product selection is good, but other sites such as Chumbo.com and Egghead.com also include business and development software in their inventory along with end-user software.

The shopping and ordering process is painless. The site also lets you track your orders online, although we would have preferred this to be log-on-based (rather than cookie-based) for added security.

BuyDirect.com

www.buydirect.com Unique because it sells software only via electronic download, BuyDirect.com can certainly fulfill your need for instant gratification—and it offers some price savings, because you won't pay any shipping. Other sites in this roundup, including Beyond.com and Chumbo.com, offer downloadable software, but they don't integrate

Reel.com V Blockbuster

www.reel.com

Hits: From DeMille to DiCaprio, you'll find what you're looking for in the stellar selection at Reel.com. Reel.com's "Smart Search" feature lets you search not only by actor or director but also by format, genre, MPAA rating, price range, or time period. Search hits are usually augmented with "film anatomy" bar charts (depicting the flicks' amount of drama, humor, sexual content, and so on), and newer films are accompanied by critics' rankings and reviews. You also get a list of films you may like based on your search.

Flops: Reel.com offers no gift service, and unlike Blockbuster On-Line, video clips are inconsistently integrated with movie pages.

The Buy: The five videos we bought totaled \$63.70, and we didn't have to pay sales tax (California residents aren't exempt, however). Shipping was more expensive than at Blockbuster—where we did have to pay sales tax—but on the whole, Reel.com offers slightly lower prices than Blockbuster. One nit: You don't get a full total (including tax and shipping charges) as you can at Blockbuster until after you've entered your credit card number.

www.blockbuster.com

Hits: Blockbuster On-Line provides easy access to Quicktime clips of selected

films, a well-designed purchasing interface, and a gift option (which didn't work when we tried it). For returns you can take your purchase and invoice to a neighborhood Blockbuster (provided it's not independently owned) for a full refund.

Flops: Blockbuster On-Line lets you search only by title and artist, and it defaults to pulling up search returns in alphabetical order. Our search for *Glant* pulled up *Attack of the Giant Leeches* and many other titles before returning the James Dean/Elizabeth Taylor classic. (Reel.com has a smarter Quick Search feature.) We received no confirmation e-mail from Blockbuster On-Line, and the message we left on the customer service line went unanswered.

The Buy: The five videos we purchased totaled \$66.51—a few dollars more than at Reel.com. Shipping is a good deal if you buy three or more videos: \$3.99 for 2-day, \$4.99 for next-day delivery. But we had to pay sales tax, so that evened out our expenses.

VERDICT Reel.com wins our vote, thanks to the excellence—and sheer amount—of information accompanying search returns, and its more elaborate search options. Though it has a respectable stock of films and competitive pricing, Blockbuster On-Line hasn't quite caught up with its online counterpart. —*Jim Léger*

MOVIES SHOPPING AGENTS

Movie shopping agents offer little in the way of Hollywood magic. Finding the best prices on the Web for movies for sale is a hit-or-miss proposition. The search mechanisms the agents use to get their results from multiple retailers are weak. Irrelevant hits are common, and searching for a director's cut—or limiting your search to DVDs or to VHS tapes—can be frustrating if not impossible.

Search Me: Both WebMarket (www.webmarket.com) and Excite Product Finder (www.excite.com) let you search by actor and director. Thus you should be able to find every movie directed by Francis Ford Coppola that starred Robert Duvall. Instead of returning this small set of films, however, both agents returned each man's entire body of work, including films one or the other had nothing to do with. Simply finding a movie is a big problem. Searches can be wildly inaccurate. Look for *Singin' in the Rain* at WebMarket and you'll get listings for the film, plus links to the Marx Brothers' *Cocoanuts*. At Excite Product Finder and mySimon (www.mysimon.com), spelling counts: Type "Singing" instead of the correct "Singin'" and you'll get just one listing.

The Goods: Excite Product Finder searches a fairly large number of merchants' sites—up to 15, depending on the search (the more information you enter, it seems, the fewer sites it queries). The same holds for mySimon, which searches 22 sites.

The Nice Price: Excite Product Finder generally returned prices that were, if not the cheapest, very close. A problem we ran into was the accuracy of listings. MySimon listed a VHS copy of *Good Will Hunting* for \$19.08 at CD Universe (\$89.99 everywhere else). Only when you go to CD Universe will you discover that the cheaper version won't be out until December.

Tools to Take Home: We give a slight nod to Excite Product Finder for its quality search and competitive prices. —*Alan Cohen*



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that feature into their sites, as BuyDirect.com does. You won't find a lot of conventional, boxed software packages like Microsoft Windows 98, but BuyDirect.com does offer a lot of software titles you won't find at more conventional sites, even in their download sections.

Although downloads are certainly faster than traditional shipping, you could still find yourself waiting 3

makes it hard to recommend for researching a purchase (you won't even find system requirements).

Its Quick Search does a good first-pass attempt at finding the products you're looking for, and you can quickly refine your searches by product title, description, manufacturer, operating system, or price. If you're just browsing, you won't find much except the most commonly



to 4 hours for a software download over modem lines. In case you have problems with the download, BuyDirect.com does provide safeguards: You simply download the software again from your custom URL. You can't resume a download that's been interrupted.

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BuySoftware.com

www.buysoftware.com With a good selection of popular software titles and an intelligent design, BuySoftware.com is a good choice if you already know what you want. Its dearth of product information

known software titles.

The well-integrated shopping cart always shows your cart items and subtotal along the left-hand border of the page, and it's easy to modify your shopping list or check out from anywhere in the site.

BuySoftware.com official policy states that because of order-processing time, it may take up to four days for "next-day" shipments to arrive. We did, however, receive our packages the day after purchase. Unlike with Beyond.com or Chumbo.com, however, you can't check the shipping status of your order online.

Chumbo.com



www.chumbo.com Good product information, a wide-ranging inventory, and excellent customer support help make

Internet Florist

www.internetflorist.com
Fresh: A nice selection of bouquets, gifts, and gift baskets designed for various occasions is complemented by helpful information, such as advice on how to care for your roses. Internet Florist lets you easily select a color and alternative color when ordering rose bouquets that aren't normally color-specific.
Wilted: You can't search by price, nor can you search simultaneously on occasion and bouquet; you click on a list of general categories to pull up a bouquet selection. Also, for same-day delivery, your order must be submitted by 11:00 A.M. in the time zone of delivery; 1-800-Flowers gives you an extra 3 hours. Internet Florist has no e-mail notification service to remind you about events and holidays. Site design is not as slick as that of 1-800-Flowers.
The Say: We bought a dozen roses, which cost \$60.90 total (\$54.95 for the flowers and a \$5.95 service charge). They were in great condition and lasted as long as could be expected. If you're purchasing only one item, you're taken to one screen to enter billing and delivery information, an easier procedure than the one at 1-800-Flowers.

1-800-Flowers

www.1800flowers.com
Fresh: With comparable offerings in terms of arrangements and occasions, 1-800-Flowers beats the competition by letting you search on three criteria: arrangement, occasion, and price (keyword searches aren't possible, but the drop-down lists are extensive). You can also select gift card type, and you get two more message lines than at Internet Florist. A reminder service will send you e-mail for upcoming birthdays and other events you pick.
Wilted: Before you can get to your shopping cart screen, you must bypass an "include an extra gift" screen. Also, with certain generic rose bouquets, it's not always clear which color you're ordering until the second-to-final screen, where you're given a Special Instructions box to indicate color preference.
The Buy: A dozen roses were a bit more expensive here—\$65.98 total (\$59.99 for the roses and a \$5.99 service charge)—but they arrived in great condition and came with a packet of flower food, something missing from the Internet Florist arrangement. When filling out the order form for multiple purchases, you can easily indicate different delivery destinations.

VERDICT For basic, straightforward purchases—particularly those involving roses—you'd do well to opt for the simplicity of Internet Florist. If you care to browse, or if you want to place a number of orders simultaneously, 1-800-Flowers' superior searching, well-fleshed-out collection of offerings, and ordering method make that site your better bet.—JL

FLOWERS A dozen roses may be the simplest of purchases, but finding the best deal for them on the Web can be complicated, because prices vary mightily both from day to day and from florist to florist. Though relatively rudimentary, flower-shopping agents are nevertheless effective at weeding through scores of sites for you.

Search Me: Excite Product Finder (jango.excite.com) and WebMarket (www.webmarket.com) provide keyword boxes to search, so you can specify exactly what you want. Excite Product Finder augments this offering with an Occasion drop-down list.

InfoSpace's Ultimate Product Search (www.infospace.com) and **mySimon** (www.mysimon.com) offer only drop-down lists of occasions from which to pick. MySimon gives you 10 different categories, InfoSpace's Ultimate Product Search only seven.

The Goods: Though the sites are similar in terms of returns, mySimon and WebMarket stand out as the most comprehensive and easy to process. You get not only merchant info and prices but also bouquet descriptions and shipping policy information. WebMarket typically features only about eight offerings per screen, which means you may have to employ "Next" more times than a Broadway director at open-call auditions. MySimon, by contrast, gets serious points for fitting all returns on a single page.

Tools to Take Home: WebMarket found us the best deals when we knew exactly what we wanted (\$29.95 for a dozen roses). For occasion searching, check out mySimon.—JL

SHOPPING AGENTS



Chumbo.com the best software site in this roundup. A clean interface also makes online research and shopping easy.

For many products, Chumbo.com provides both ZDNet product reviews and customer feedback to augment the marketing-level product overviews that all the sites offer. The customer feedback is fairly detailed: You get ratings in five categories, an overall score, and comments from individual reviewers. After you purchase a product from Chumbo.com, you can rate it.

Although we thought other sites, such as Beyond.com and BuySoftware.com, had better search mechanisms, we found this site fairly easy to navigate. Chumbo.com has an ample range of software titles and does a good job of letting users browse its inventory, which includes software for both business and home uses.

We especially liked Chumbo.com's customer support. You can track your orders—including the status of FedEx shipments—directly from the

Web site. Furthermore, Chumbo.com was the vendor quickest to respond to our request for product return.

Egghead.com

www.egghead.com The only established name brand in this roundup, Egghead.com shut down all its retail stores to focus exclusively on Web and phone sales. In the process, the company may have forgotten some basic retailing tenets that are important in any medium.

The site has a wide product selection and fairly low prices, but Egghead.com makes it hard to find what you want. Furthermore, Egghead.com's order fulfillment and customer service departments aren't as streamlined as those of the better Web sites reviewed, such as Chumbo.com.

At times it's hard—if not impossible—to find the titles you're looking for at the site. For example, we did a search on Microsoft Excel and got over 100 results, with OCR software and hand-held computers appearing before Excel. We also got listings

for Excel 5.0—with no indication that the software is out of date.

The product descriptions on the site varied in quality. Some included a good overview and system specifications, while many provided only basic facts.

Egghead.com was the only ven-

dor that couldn't ship our order "next-day." The company offers two-day service, which we selected, but our order came on the third day after purchase. Egghead.com was also the only vendor in this group that didn't give us an e-mail confirmation of our order.



According to a recent study, more Americans have purchased a book online than any other item. Considering that all the book sites we review here offer a pleasing and efficient shopping experience, we think that bodes well for the future of e-commerce.

Amazon.com is the trendsetter here, with its healthy discounts, large inventory, notification service, one-click shopping, recommendations, and sense of community. Amazon.com's offerings have made it the third-largest bookseller in the country, behind Barnes & Noble and Borders. But just as Amazon.com has crept up on the bookselling giants, barnesandnoble.com and Borders.com are creeping up on it, matching Amazon.com's prices and inventory. **By Doug Belizer**

Amazon.com



www.amazon.com The Web commerce pioneer Amazon.com faces steeper competition than ever before. Its prices and selection are no longer the best on the Web; its major competitors have matched those, and you can find plenty of smaller sites that beat its prices. But Amazon.com still stands out because of its superior community, search capability, and breadth of content.

Amazon.com is the only site that's as much a community as it is a store. With its customer star ratings, sales

rank listings for all its titles, automatically generated recommendations integrated into the site, and voluminous user reviews, you feel thoroughly part of the site and encouraged to participate. You can't easily find an invitation to write a review like at barnesandnoble.com, although the site has customer reviews.

While we like the customer recommendation feature, you can't take it too seriously. It sometimes points you to unrelated titles; when we said we liked *The First Coming: Tiger Woods, Master or Martyr*, it recommended the totally unrelated



SOFTWARE

With so much software out there—and so many places to buy it on the Web—you need tools to help you sort it all out. The best agents give useful product information and find price quotes from a large number of vendors to help you choose what to buy and where.

When You Don't Know What You Want: KillerApp (**www.killerapp.com**) is the best site we've seen; the user interface lets you quickly browse through the site's large product database. You can then read product overviews, search for the best price in its retailer network, and have KillerApp sort the results.

ZDNet's **computershopper.com** (**www.computershopper.com**) and CNET's **Shopper.com** (**www.shopper.com**) have large product databases, but the information they provide isn't always useful. Computershopper.com does provide side-by-side comparisons, but the interface is hard to use and is cluttered with ads. Shopper.com doesn't give you a lot of comparative product information.

When You're Looking for a Deal: KillerApp and Shopper.com are the best in this category. You start by finding the product, then shop around for the best price.

Some of the other sites make it hard to accomplish this simple task. For example, **Bottom Dollar** (**www.bottomdollar.com**), **Excite Product Finder** (**jango.excite.com**), and **mySimon** (**www.mysimon.com**) return too many search results, so you spend a lot of time looking at product lists you don't care about.

Tools to Take Home: Prices change often so start with the best sites—KillerApp and Shopper.com—and then work your way to the next sites.—JG

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Against All Enemies: Gulf War Syndrome.

Amazon.com's search functions are top-notch. Unlike the Borders.com search, which pulls up results in useless alphabetical order, Amazon.com's keyword search lists the best results first.

barnesandnoble.com

www.barnesandnoble.com Once you've set up an account at barnesandnoble.com, you may never feel the need to walk into one of the company's stores again. The online version features competitive prices (and steeper discounts than you'll find at

any Barnes & Noble superstore) and a wealth of professional and member reviews.

Barnesandnoble.com clearly has been studying Amazon.com's site. The two are incredibly similar, but barnesandnoble.com left a few things we like at Amazon.com out of its mix. You won't get as much detailed information on an individual title page: no sales rank, no average rating based on customer reviews. In fact, you'll find far fewer user reviews at barnesandnoble.com than at Amazon.com, giving the site less of a community feel.

We also missed the recommendations that Amazon.com integrates into its book pages. For example, barnesandnoble.com's information page for *The Bourne Identity* tells you that the book is the first of a series by Robert Ludlum, but it doesn't list the other titles in the series. At Amazon.com, the other titles in the series were among the recommendations.

One neat, albeit small, unique feature of barnesandnoble.com is that it's easier to find all versions of a book. You'll find the links to audio books or paperbacks right on the

info page; at Amazon.com, you have to do an author search.

Borders

www.borders.com The latest of the book superstores to hit the Web, Borders.com matches the competition in both price and selection. Yet Borders clearly has some work to do before catching up to Amazon.com and barnesandnoble.com. The site offers none of the content that you get on a book page at Amazon.com or barnesandnoble.com, with few reviews and no recommendations.

Its search functionality is very disappointing. The site's combination of simple keyword-based returns in alphabetical order and its maximum return set of 100 hits is a misbegotten one. For example, if you search for *War and Peace*, you will not find Tolstoy's novel among your first 100 returns. The only way to have a chance of finding what you want is to go to the somewhat hidden Search Options | Search and check Exact Start of Title Only before searching. Borders.com also doesn't have a quick-purchase option as its competitors do, so you'll always have to go through the whole Shopping Bag.



BOOKS

In theory, shopping agents for books are great: Plug in an author and a title and find out which of the dozens of online booksellers has the best buy. In practice, it's not quite so simple. If you're looking for an obscure book, though, an agent may help you find it by doing the research work for you.

Search Me: Acses (www.acses.com) claims to search over 25 sites, yet in many searches it was unable to query the bulk of its merchants (notably BookServe, which often returned the cheapest results). Unlike most agents, Acses tells you which sites it's having trouble searching.

MySimon (www.mysimon.com) and **WebMarket** (www.webmarket.com) ask you for a title or author and then input this information directly into the search engines at the vendor sites. You can't narrow down your choice if more than one book fits the keyword. Only **MX BookFinder** (www.mxbookfinder.com), a terrific tool for finding used and rare books, lets you input a specific price range.

The Goods: Acses's intelligent search methodology eliminates irrelevant hits. Returns are displayed in an easy-to-read chart by cost, including shipping. MySimon and WebMarket found sites with cheaper prices than Acses found (usually by just a few pennies with paperbacks), but you'll have to wade through long lists of often irrelevant titles to find them. For example, typing *Dune* into mySimon got us 129 results from 9 different sites.

Tools to Take Home: While the information returned by Acses and MX BookFinder was detailed and accurate, other agents were occasionally not. Acses's competitive prices and well-organized search results give it the edge over the competition.—AC



Music

Musical tastes are a very personal thing. The three major sites we review here have plenty in common, but some do a better job than others at delivering the lowest prices and creating a congenial shopping environment that entices you to return.

We were most impressed by the personalization features at CDnow; and Music Boulevard did an excellent job of aggregating content and offering the widest variety of sound clips, including downloadable MPEG files. Both CDnow and

Music Boulevard are comparable in price and selection; if you always want the best deal, you should check both sites. Tower falls a bit behind its Web-only competition, with weaker selection and higher prices. **By Emily Cohen**

CDnow



www.cdnow.com With the most impressive array of personal touches, a great selection, competitive prices, and the easiest interface on the eyes (those black backgrounds at Music Boulevard and Tower Records can get oppressive), CDnow is the best music store on the Web. Our primary complaint stems from its "standard delivery" information being misleading about when you're going to get your CDs. Two- to three-day deliveries aren't considered late until two weeks go by.

The aggregation of all of CDnow's personalization features—and its crowning achievement—is My CDnow. Once you register with CDnow you can take advantage of all its tools. See an item you like but

you're not ready to buy? Put it on your wish list. Your birthday's coming up? Publish your wish list to your gift registry, which friends can access with your e-mail address or a personal URL that's generated instantly. You can also help train the site's recommendation engine to be smarter when picking new music for you, customize CDnow e-mail updates, and keep track of all your past orders. Neither Music Boulevard nor Tower Records has anything like this.

Music Boulevard

www.musicblvd.com Take a stroll on the Music Boulevard and you'll find a site with competitive prices, great information on recommended and related artists and groups, and the best music-clip previews, but an



MUSIC

Music shopping agents do not inspire a whole lot of confidence. You may find deals as the sites query multiple retailers to get their pricing, but the interfaces are clunky and the results haphazard.

Search Me: Searching for classical music is particularly frustrating. Only one agent, **Bottom Dollar** (www.bottomdollar.com), was able to find the London Classical Players' version of Beethoven's Symphony # 3.

WebMarket (www.webmarket.com) lets you enter both an artist and an album name on each search. But when we looked for John Fogerty's latest album, *Premonition*, we were given only a long list of many other Fogerty titles.

Bottom Dollar and **mySimon** (www.mysimon.com) were both characterized by awkward searching. MySimon asks for keywords, but the more words you enter, the poorer the quality of the results.

The Goods: Every agent we looked at returned irrelevant or inconsistent results. Often WebMarket listed a particular album more than once from the same vendor.

The Nice Price: Bottom Dollar and mySimon consistently returned the lowest prices, although neither was easy to use. Occasionally WebMarket listed albums as having a price of \$0! A deal, indeed—too good to be true.

Tools to Take Home: MySimon searches a large number of merchants, and its prices were among the lowest. —AC

Inconsistent search mechanism may leave you at a dead end. Music Boulevard's poor search feature and its lack of the personalized bells and whistles that CDnow has leave it a strong second choice on our charts.

You'll find the slickest product pages among any of these music stores at Music Boulevard. For most albums, you'll get track listings, easy links to reviews, 30-second RealAudio and downloadable MPEG clips, and lists of related artists and influences—all in an easy-to-scroll presentation. The downloadable clips and related information are unique to Music Boulevard in this roundup.

Music Boulevard provides the most consistent navigation of the music sites we reviewed, but that easy experience does not extend to its search functionality, which lacked intelligence. Search for the album name *What's Going On* and you'll come up empty, but search for Marvin Gaye's work and you'll quickly pull up the album. We also searched for popular songs that we knew were in a track listing on the site and still struck out. We didn't

encounter these problems at CDnow or towerrecords.

towerrecords

www.towerrecords.com If you're coming to Tower Records' Web site hoping for the Web equivalent of its excellent brick-and-mortar stores, think again. Towerrecords' selection doesn't compare with CDnow's or Music Boulevard's, and the prices don't measure up to the usually reasonably priced real-world Tower Records. And this is the only site in this group that doesn't yet have an account function (although one is planned and may be up by the time you read this), so even the most loyal repeat shoppers will feel like strangers.

Most of the albums we found at towerrecords were \$2 to \$3 more expensive than at CDnow or Music Boulevard (and sometimes even more). For example, The Beatles' *White Album* was \$8 more expensive at towerrecords than elsewhere. Tower's Top1000 albums are discounted, but even the discounted prices generally end up being higher than you'll find elsewhere. **PC**

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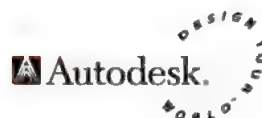


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By now, just about everyone has heard the breathless predictions about the coming explosion in e-commerce. From the corner store to the corporate boardroom, entrepreneurs recognize that there's money to be made online. The debate is no longer about whether you should put your business online but about what is the best way to do it. That is no easy question, especially for small businesses that lack the resources to throw at the problem. But there's a solution.

A new group of e-commerce solutions let small businesses take a dip into e-commerce without getting in over their heads. These turnkey solutions offer several advantages. First, you can forget about hiring a Webmaster or design consultant. No knowledge of HTML is required, because all the site design is done using ready-made templates or (in a few cases) WYSIWYG

Visit our Web site for a list of links to great resources for small businesses seeking to do business online.

Commerce Made Simple.....169	Internet Creator E-Commerce Edition 4.05182	SecureMerchant 2.0193	Editors' Choice165
IBM HomePage Creator for e-business170	MerchandiZer 2.03187	ShopBuilder 2.5195	The Costs of E-Commerce.....168
ICat Commerce Online178	Netcom Small Business Pack187	Virtual Spin Internet Store 4.5197	Other Options175
		Yahoo! Store199	Summary of Features.....196

authoring tools. Second, all the little details—such as domain name and search site registration, credit card authorization, payment processing, and shipping and taxes—are largely taken care of for you. But perhaps the biggest advantage is that you don't need to purchase and configure a Web server; someone else will take care of the site hosting.

All that sounds good on paper, but to see how these solutions really work, we set out to test them in a real-world setting by building an actual store with each. Our guinea pig was a small retail store called Touch of Europe in Westport, Connecticut, which sells bedding and gifts imported from Europe. We gave each of our reviewers a basic library of images (a banner, a background, and photographs of products and the store) and a Microsoft Excel file containing data on about 50 products, then turned them loose. When the test stores were completed, a jury of shoppers rated the design, navigation, and buying experience at each site. We were impressed with the value provided by these products. The best of them offer all the features a small-business owner needs to create, host, and administer a professional-looking site without sinking a lot of

REVIEW CRITERIA

The products reviewed in our story are comprehensive solutions designed for small retail businesses. To qualify for a review, each solution had to:

- include templates or authoring tools or recommend a specific third-party authoring tool (such as Microsoft FrontPage 98) for creating the storefront and the product catalog;
- support off-line or online order processing;
- include site hosting either directly or through one or more partners;
- cost less than \$2,000 for the first year, including setup fees, software costs (if any), monthly hosting fees, and miscellaneous fees, such as those for domain name registration with InterNIC and payment-processing services. See "The Real Costs of E-Commerce" for more on the pricing of these solutions.

time or money into the project.

The ten products we reviewed for our story represent a range of scenarios available for small business. Software-based solutions, such as Forman Interactive Corp.'s Internet Creator E-Commerce Edition and NetVentures' ShopBuilder, let you build your site locally and upload it to the company's or a hosting partner's server. Internet service providers (ISPs), including Netcom On-Line Communication Services and Simple Network Communications,

bundle third-party tools such as authoring programs with their business hosting plans. Finally, the online-only packages—IBM HomePage Creator for e-business, iCat Commerce Online, HipHip Software's MerchandiZer, SunCommerce Corp.'s SecureMerchant, Virtual Spin Internet Store, and Yahoo! Store (formerly known as Viaweb Store)—let you design and administer your site via a Web browser.

Each of these packages costs less than \$2,000 for the first year, including initial setup fees, software (if there is any), monthly hosting fees, and miscellaneous fees for services such as registering your domain name with InterNIC and setting up payment processing. Some products cost considerably less. For example, if your business has ten products or fewer, iCat Commerce Online is completely free. For more on pricing, see the sidebar "The Real Costs of E-Commerce."

No matter which type of solution you choose, you'll get authoring tools for designing pages and creating a catalog, some level of order processing, and hosting. Many also provide reporting tools that help you keep tabs on online sales and the comings and goings at your site. But each scenario has its advantages and disadvantages.

SETTING UP SHOP

Catalog Size	Monthly Fee	Set up Fee
10 items	\$14.90	\$149.00

Getting Started Many e-commerce solutions designed for small businesses are online only; there's no software to install. To get started, all you need is an Internet connection and your browser. Because all the hosting services and tools you need are integrated in a single solution, you can get up and running quickly and at a relatively low cost. HipHip Software's MerchandiZer is an example of an online-only solution.

Create Your Store

MerchandiZer provides two different ways of building a store: You can walk through the process using a wizard or enter the information directly into a series of HTML forms. After you enter some basic information, you have to define the structure of your store by organizing products into groups and subgroups.

Enter Product Sub

Catalog Items

Upload Image and Page Files to the Server

Use this facility for uploading your catalog images and any HTML pages.

Catalog Items

Add Products Like most of the products reviewed here, MerchandiZer relies on templates to generate the layout for a site. The package offers more than 20 different design templates. To stock your store, you enter the data into the wizard or forms by hand. You can include a thumbnail image and a larger, zoomed image for each product.

EDITORS' CHOICE

• MerchandiZer 2.03



We know you've heard this before: It's so easy anyone can do it. But that's no exaggeration, at least in this category of e-commerce software and solutions. You can build a professional-looking e-commerce site without knowing any HTML or

breaking the bank. And the best product for the job is HipHip Software's MerchandiZer 2.03.

MerchandiZer is an online-only solution that lets you build and manage your store with just a browser and an Internet connection. To design your site, you can either enter all of the information in a step-by-step wizard, or you can work directly with

MerchandiZer

HTML forms to add to and modify your site. As for the catalog, you can enter product information manually or import it into a Microsoft Access database.

MerchandiZer does not require a merchant account, allowing you to accept transactions off-line, and add a merchant account when desired. And it was one of the few products that went beyond design and hosting. For instance, you can set up discount clubs, put items on sale, create mass mailings, and access a broad range of reports.

Some other products deserve honorable mentions. Yahoo! Store (formerly Viaweb) remains a strong contender in this category, whereas iCat Commerce Online makes an impressive debut. Finally, we especially liked the authoring tools provided by Forman Interactive's Internet Creator E-Commerce Edition 4.05 and IBM HomePage Creator for e-business.

Online services and ISPs usually offer the most robust hosting services. And the included third-party tools such as NetObjects Fusion tend to be more flexible and powerful than the strictly template-based authoring tools found in other packages. But because they rely on third-party tools, these packages typically are not as well integrated as other solutions and therefore can be more difficult to use. Some of the major online services and ISPs—such as America Online, AT&T WorldNet,

and CompuServe—also offer business hosting plans but not complete solutions (for details see the sidebar “Other Options for Doing Business Online”). If you already have an ISP, check first to see if it offers a small-business solution such as the ones reviewed here.

Online-only solutions don't offer the same flexibility, but for several reasons, they are arguably the fastest and easiest route to opening your doors online. First, there's no software to install. Second, all

the pieces of the store—from site design to order processing to store administration and reporting—are integrated into a single solution accessible from any browser interface. Finally, the authoring tools are template-driven, so all you need to do is fill in the blanks. The main drawback to this approach is that you are locked into the company's store designs, although a few products let you customize some features of the templates.

Somewhere in the middle are the soft-

Calculating Costs In most cases, you enter sales tax and shipping information manually. MerchandiZer lets you enter state tax rates once, and thereafter it automatically calculates taxes based on the billing address and provides all UPS options.

Manage Your Store After your grand opening online, you can tend to your store using the same online tools you used to design it, as well as collect details on your customers and their purchases. You can assign sale prices for specified periods, establish discount clubs, and even create mass mailings.

Credit Cards to Accept

Please select YES to the cards that you wish to accept:

Order Processing

We especially like that MerchandiZer lets you start with off-line transactions and later add real-time transaction processing if your business grows. You'll then need to obtain a merchant account and register with a credit card authorization service.

Refresh Catalog Search Engine

The purpose of this screen is to enable your customers at the front of the site to do searches on your catalog items. This is done by using the built-in browser. The program will create the individual words in the catalog and make them into a searchable frequency that are processed as all words longer than 3 letters which are entered following the search engine.

- Description 1
- Description 2
- Long Description
- Description 4

...through the process after entering each new product into the catalog.

Searching A search spider indexes key data fields on your site, so customers can search for items in your catalog.

Reports You'll want two types of reports: site statistics and sales. MerchandiZer's site statistics include data on traffic volume, how visitors arrived at your site, and what they clicked on once they arrived. Sales reports include data on new customers, items to be shipped, orders received, and sales analysis.

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* The Elite 12/600, Elite 1212, and the Elite XL 608LC support one additional paper feeder. The Elite XL 20/600, Elite XL 20/800, and the Elite XL 20/1200 support two additional trays.

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THE COSTS OF E-COMMERCE

	Commerce Made Simple	IBM HomePage Creator for e-Business	iCat Commerce Online	Internet Creator E-Commerce Edition 4.05	PC MAGAZINE EDITORS' CHOICE MerchandiZer 2.03	Netcom Small Business Pack	Secure Merchant 2.0
Initial setup fee	\$799.00	\$24.95	None	\$50.00	\$149.00	\$125.00	None
Hosting per month (number of items)	\$59.00 (unlimited)	\$69.95 first month free (50)	\$49.95 first month free (50)	\$59.00 (unlimited)	\$79.95 (100)	\$69.95 (50)	\$99.95 first month free (250)
Miscellaneous fees	InterNIC \$70, credit card transactions, \$25 per month	InterNIC \$70, credit card transactions, \$125 plus \$1 per transaction	InterNIC, \$120, real-time credit card authorization, \$249	InterNIC \$70	InterNIC, \$70, credit card transactions, \$150	Must upgrade to ShopSite Manager for credit card transactions (\$495)	InterNIC \$70, 5 percent fee per credit card transaction
Total estimated cost for first year	\$1,880	\$990	\$920	\$830	\$1,330	\$1,470	\$1,170

ware-based solutions. These offer some of the flexibility of the third-party tools provided by hosting services but tend to be a little easier to use. Internet Creator, for instance, is a full WYSIWYG authoring environment similar to Microsoft FrontPage. During the design phase, stand-alone software is faster than online-only solutions, because you aren't doing all of your work over an Internet connection (an arrangement that was especially frustrating when we entered product information during our testing). Of course, when you're done creating your store locally you have to upload everything—typically to a third party that provides hosting. We didn't encounter any real problems on our tests, but there's certainly more room for error using this approach than with a single online solution providing both tools and hosting.

As might be expected for a category of software that's relatively new, we often found major disparities in features. For example, many products at this level require you to enter product information manually. Even with our relatively small test store, we found this arduous. A few products let you import existing product data directly into your catalog—a necessity for businesses with larger inventories.

Another differentiating factor is order processing. Some products support only off-line transactions, so when you are notified of a new order, you must process it manually as you would any order. Several also support online credit card transactions, which can take place in batches at intervals or in real time. To process credit card transactions, you'll need a merchant bank account and credit card verification and payment-processing services; the ven-

dor should be able to help with all of these.

Two related features, taxes and shipping, are also handled differently. In most cases, you enter this information by hand into tables and the shopping-cart software automatically adds the appropriate charges based on the customer's billing address. Some products make no provisions for taxes, however. Others try to make things easy for you. Virtual Spin Internet Store provides default data for the tax tables. MerchandiZer includes all of the shipping options and rates for UPS delivery.

The final area in which we saw a lot of variation is reporting. Many small-business solutions simply don't have it. But a few offer a good range of reports, and

some bundle third-party tools such as WebTrends for maximum power.

Of course, there are a few features that none of the products at this level deliver. Personalization, for example, which lets your site keep track of customers' buying histories and preferences, is rare; only iCat and MerchandiZer attempt to address this area. Second, none of these products integrate with other software used to manage your business, such as inventory databases or accounting programs. For such features, you'll need to jump to midrange products such as iCat Electronic Commerce Suite and Microsoft Site Server, which range from about \$3,500 to \$10,000.

Just about everything a small business

SUITABILITY TO TASK

	Commerce Made Simple	IBM HomePage Creator for e-Business	iCat Commerce Online	Internet Creator E-Commerce Edition 4.05
POWER				
Installation and setup	Fair	Fair	Good	Good
Site design	Poor	Good	Fair	Excellent
Order processing	Good	Poor	Good	Fair
Hosting	Fair	Fair	Good	Good
Administration and reporting	N/A	N/A	Good	N/A
EASE				
Installation and setup	Good	Excellent	Excellent	Good
Site design	Fair	Excellent	Excellent	Excellent
Order processing	Good	Fair	Good	Fair
Hosting	Good	Good	Good	Good
Administration and reporting	N/A	N/A	Excellent	N/A

N/A = Not applicable. The product does not have this feature.

The process of **installation and setup** can vary drastically among the products in this category. Online-only solutions require no software, while other solutions rely on one or more applications. For this task, we evaluate the steps required before you start designing your storefront. We also consider the availability and quality of support provided by online help and tutorials. Some companies offer additional e-commerce resources on their Web sites.

The **site design** task includes the creation of both the storefront and the product catalog. Some products provide

wizards or templates, and others offer full-fledged authoring tools. For this task, we look for site-design tools that are easy to use and provide the power and flexibility to create a customized, professional look. The product should provide a means for importing product data, as well as an efficient method for inputting data manually. The ability to generate frames, built-in search capabilities, and other navigational aids are also a plus.

Perhaps the most critical task for an online store, **order processing** is also one of the most complex. Some products support only off-line transactions; others also support real-time

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offers a relatively complete set of order-processing features but the package lacks an authoring tool, robust reporting, and inventory tracking. Most first-time site developers will be better off with one of the more comprehensive and lower-priced solutions we also reviewed.

CMS costs \$59 per month with a \$799 setup fee. Credit card transactions cost an additional \$25 per month. Add it all up, and CMS is the most costly solution we tested. There are no limits on the amount of storage space, number of products, or page hits, however.

All CMS activity is done online and requires only a browser. Of the products we looked at, CMS is the only one that does not provide any Web site development or page authoring tools. SimpleNet takes the view that most merchants will already have a Web site or will choose to build one with another authoring tool such as Microsoft FrontPage. This assumption, however, will limit the market for CMS among small and medium-size companies that feel more comfortable with a single-source solution.

Not having a front-end development

tool also introduces design problems. For instance, maintaining consistency between the appearance of a basic site designed with a third-party tool and the online store created by Miva Merchant was difficult. SimpleNet plans to address this problem by adding style templates that merchants can use to match their original site style.

SimpleNet has good tutorials for creating a Web site, but they make no reference to e-commerce or online stores. We'd like to see SimpleNet provide some instructions on the whys and wherefores of creating and linking a Web site with a store catalog. Even basics such as using a URL to shift from one Web page to another may be confusing to merchants with little or no Web experience.

The Miva Merchant (formerly Kool-Cat) server, which SimpleNet runs, provides good product categorization and searching capabilities. The server interprets custom tags from the XML-based Miva scripting language. This scripting makes Miva a very flexible product, but programming it is outside the expertise of most merchants. Miva also has a PC client version, Miva Mia, which is useful when loading data over the Internet proves too slow.

In addition to the Shopping Basket (SimpleNet's version of the shopping cart), Miva Merchant covers sales taxes, currency formats, payment variations, and shipping calculations. We particularly liked the incorporated UPS program for online calculation of shipping costs—a feature offered by only one other program, HipHip Software's MerchandiZer 2.03. CyberSource and Authorize-Net currently provide payment authorization, with CyberCash to be added shortly. The transaction is handled through a VeriSign secure server key and can be encrypted using SSL (Secure Sockets Layer). The merchant can be notified by e-mail of purchases, and the Fulfillment Module can send confirmation to the customer. Aside from the lack of customer notification and inventory tracking, CMS provides a full set of order-processing features.

Site statistics are available through the SimpleNet account services, but unfortu-

could ask for is present in these less daunting solutions. So although your business won't become an Amazon.com overnight, you can open up new opportunities online today.

Commerce Made Simple

Estimated cost for first year (50 products): \$1,880. Simple Network Communications Inc., San Diego; 619-881-3090; www.simplenet.com; 501 at www.pcmag.com/infolink.

Teaming SimpleNet's hosting service with Miva Corp.'s e-commerce package Miva Merchant, Commerce Made Simple (CMS) is designed for businesses that want to add e-commerce capabilities to a SimpleNet-hosted site. For those customers, CMS

MerchandiZer 2.03	Netcom Small Business Pack	SecureMerchant 2.0	ShopBuilder 2.5	Virtual Spin Internet Store	Yahoo! Store
Excellent	Good	Fair	Good	Good	Good
Excellent	Good	Fair	Fair	Fair	Excellent
Excellent	Good	Fair	Good	Excellent	Good
Good	Excellent	Good	Fair	Good	Good
Excellent	Good	Fair	Fair	Good	Excellent
Excellent	Fair	Good	Good	Good	Excellent
Excellent	Fair	Good	Good	Good	Excellent
Excellent	Fair	Good	Good	Good	Excellent
Good	Good	Good	Fair	Good	Good
Excellent	Fair	Good	Fair	Fair	Excellent

credit card transactions. The solution should facilitate the process of setting up secure, real-time transactions (obtaining a merchant account and registering with a credit card verification and payment processing service). We look at other features including how each program handles taxes and shipping as well as customer confirmation and merchant notification of new orders.

Some companies provide hosting as part of their e-commerce solutions, and others partner with third parties. Hosting begins with the process of uploading files (HTML pages and images) to the host's server. Once we upload our site, we test it to see if

there are any problems. We rate the quality of technical support provided by the hosting service. Additional e-commerce resources on the hosting service's Web site are also a plus.

For our final task, **administration and reporting**, we look for solutions that offer an easy application for adding to or modifying the site or product catalog online. Specific features include adding or removing products, changing prices, and creating sales promotions. We look for reporting tools that provide comprehensive data on both the site and online sales. Reporting tools may be integrated with the solution or offered via a third-party tool.

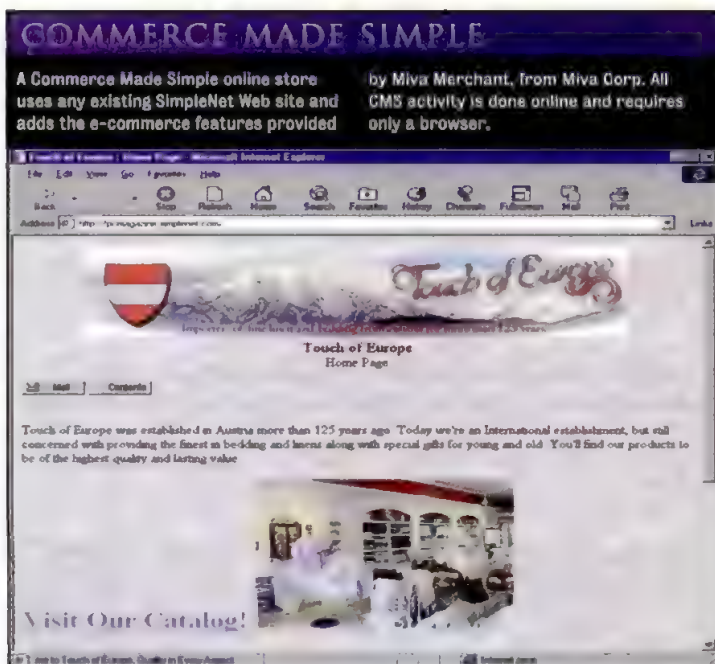
nately this feature is not clearly spelled out in the CMS documentation. Sales reporting is not currently provided by CMS, and because CMS has no ability to download the data, sales information must be transferred from the screen manually. Such a limitation isn't a problem if the transaction volume is small, but many competing products include a download feature, which makes them more scalable. SimpleNet is aware of these limitations and has plans to add features, such as data import and export, in future versions of CMS.

Commerce Made Simple and Miva Merchant are in the early stages of their development. Although its order-processing features are strong, SimpleNet needs to bolster the authoring, site administration, and reporting features to compete with the more well-rounded packages reviewed in this roundup.—*Nelson King*

IBM HomePage Creator for e-business

Estimated cost for first year (50 products): \$990. IBM Corp., White Plains, NY; 800-426-4968, 770-863-1234; www.ibm.com/hpc; 502 at www.pcmag.com/infolink.

Although IBM HomePage Creator for e-business is a new entry in the small business, e-commerce field, it boasts a top-notch storefront creation tool. But on the back end, the product does not have the depth of some of the other solutions we reviewed. For instance, it lacks reporting and analysis tools, a database upload feature and offers only relatively inflexible handling of orders and shipping. Despite these shortcomings, however, HomePage Creator is competitively priced, and IBM plans to add some advanced functionality to it by the first quarter of 1999, such as database uploads and

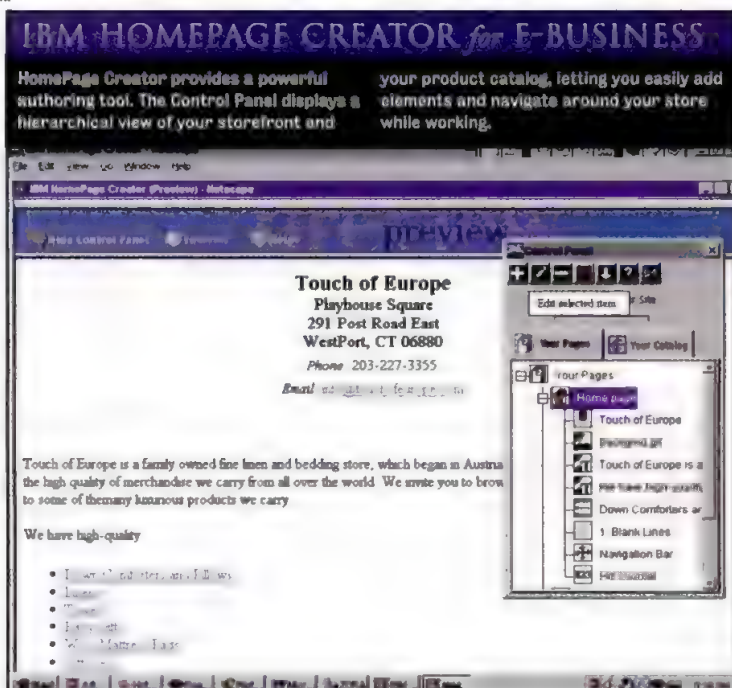


reporting as found in IBM's higher-end product, Net.Commerce.

With a one-time setup fee of \$24.95 and a monthly fee of \$24.95, the basic plan grants you five pages, 12 catalog items, 3MB of storage, and 40MB of bandwidth. Furthermore, your site is automatically listed with 20 search engines. You are instructed on how to register your site with InterNIC, but unlike Yahoo! Store and Netcom Small Business Pack, the InterNIC fee isn't included in the service

price. IBM also offers a free 30-day trial. The design of HomePage Creator's storefront software is absolutely spot on, though you must use either Netscape Navigator 4.06 on Microsoft Windows 95, 98, or NT, or Microsoft Internet Explorer 4.01. A true WYSIWYG solution, HomePage Creator's authoring tool was one of the easiest to use in this roundup. You can't work in your store as it takes shape, however, as you can with Yahoo! Store's Test Drive feature, for example.

The HomePage Creator tutorial acquaints you with the screen and commands you'll be working with. In addition, IBM has included some effective guides to setting up shop online that help you to evaluate your goals, plan the layout of your storefront before you begin building it, and other such topics. Good guides are not an essential feature, but small business owners will certainly appreciate this feature.



HomePage Creator also includes a vast stable of layout and storefront design templates, which are essentially elaborate full-page clip art, as well as simple art files for use as buttons, site decoration, and so forth. If you have your own graphics to populate your site, uploading them to Your Gallery is as easily said as done. For example, to put the photo of a comforter in both the catalog and our merchandise page, we simply uploaded it to the Your Gallery section. Two clicks later it was on both pages.

Once you begin creating your store, you never have to leave the area to make changes, a feature we loved. HomePage Creator also wins points for making it easy to see what you're doing as you're doing it. The control panel, which can be hidden, provides a hierarchical family-tree view of your storefront. From there, you can

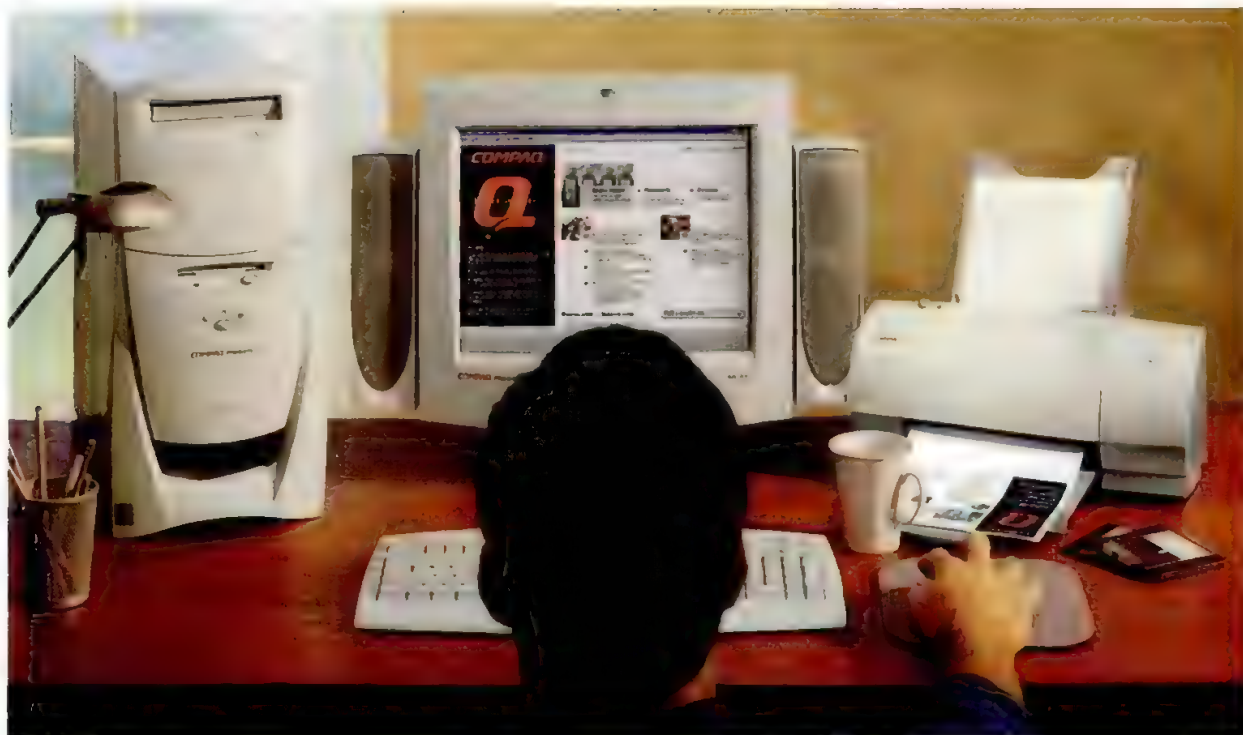
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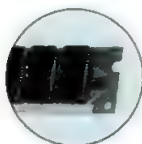


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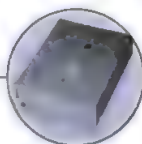
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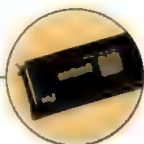
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- 256-bit Accelerated Graphics w/2.5 MB VRAM
- Easy Access Buttons
- JBL Pro Audio with Bass Reflex
- Microsoft Office 97 Small Business Edition
- Microsoft Windows98

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- 24X Max CD-ROM Drive²
- 56K ITU v.90 Modem³
- Smart Lilon Battery
- 512 KB L2 Pipeline Burst Cache
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- Microsoft Windows98

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Compaq IJ 200

\$129⁹⁹

- Single-head thermal inkjet technology
- Up to 600 x 600 DPI resolution
- Sharp text and sharp color prints
- Print Speeds:
Up to 3 1/4 pages per minute black
Up to 1 1/2 pages per minute color
- Paper tray holds up to 30 sheets



Compaq IJ 700

\$229⁹⁹

- Dual-head thermal inkjet technology
- 6-color photo-printing capability
- Up to 1200 x 1200 DPI resolution
- Sharp text and sharp color prints
- Print Speeds:
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Up to 2 pages per minute color



Compaq IJ 900

\$299⁹⁹

- Dual-head thermal inkjet technology
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OTHER OPTIONS FOR DOING BUSINESS ONLINE

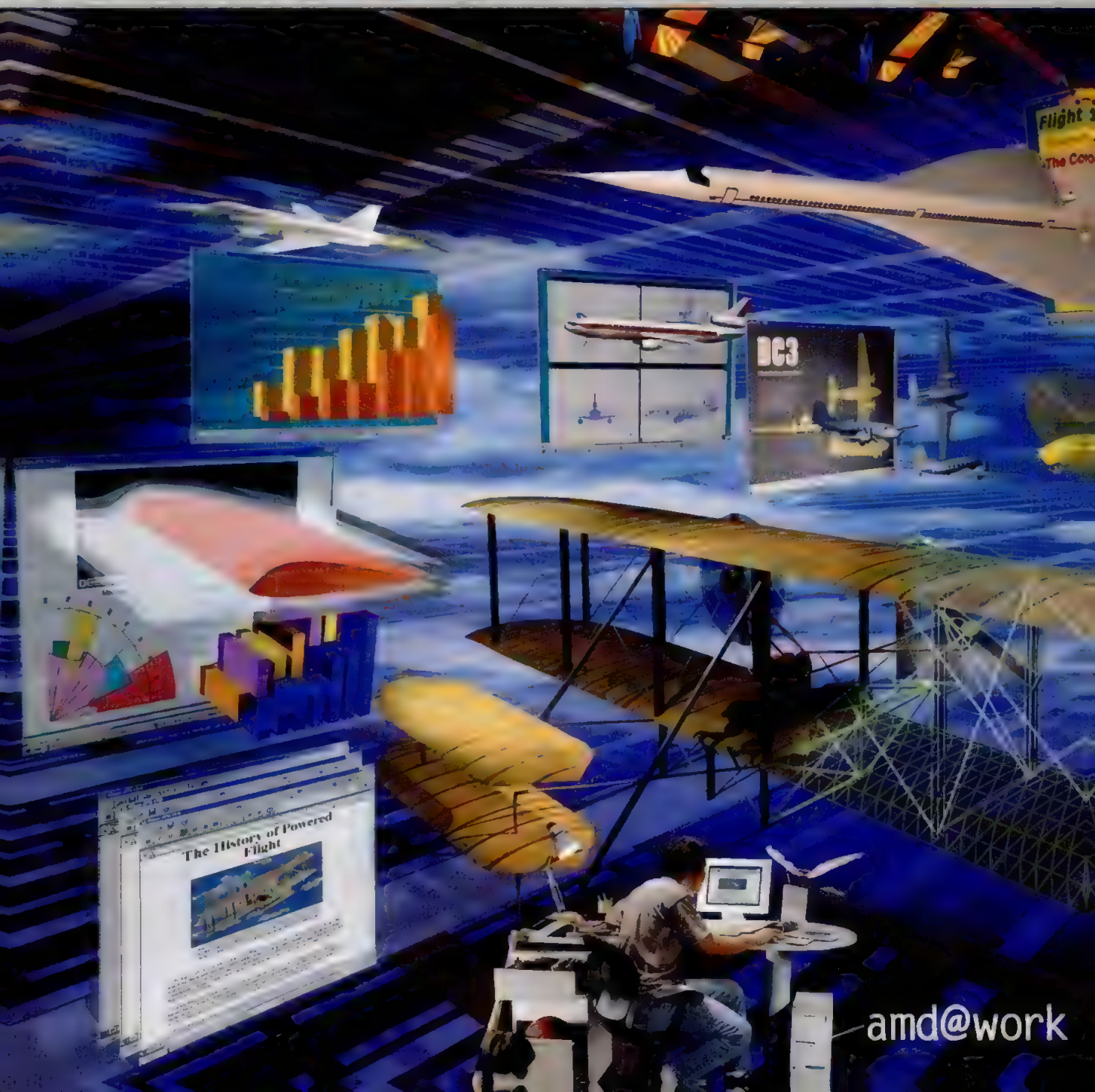
For our main story, we focused on complete solutions for small business. But there are many other small-business packages out there that may provide all you need. *By Nelson King*

PRODUCT/ COMPANY	GENERAL	SITE DESIGN	ORDER PROCESSING	HOSTING	ADMINISTRATION AND REPORTING
AOL PRIMEHOST America Online Inc. 888-265-1111 www.aol.com	The business hosting service of the largest online service costs \$99 a month. A private domain name costs an extra \$70 (InterNIC fee) for two years.	AOL provides six design templates to generate basic Web pages automatically for your site. It allows for some customization of colors, style, and text. For more flexibility, you can use AOL's authoring program, AOLPress, or a third-party tool.	No order processing is available	Includes 50MB of disk space and 1,500MB of bandwidth per month. AOL also offers the newsletter <i>PrimeHost Prime-Line</i> , a listing in the AOL Business Directory, and online and toll-free support for Web development and promotion	No administration or reporting features
COMPUERVE BusinessWeb CompuServe Interactive Services Inc. 800-441-8590 businessweb.csi.com	CompuServe's hosting service for businesses is priced at \$79 a month, with a one-time setup fee of \$50. A private domain name costs an additional \$70 for two years (InterNIC fee)	Includes a limited version of one of the most popular authoring tools, NetObjects Fusion. You can upload the site to a preview area for testing before going live	No order processing is available	The hosting service includes CompuServe membership and Internet access. It also provides CompuServe Business Directory and Business Functionality Library, the publication <i>Computing Pro</i> , and Cybermedia Oil Change	Limited administration and reporting features
ECBUILDER Multiactive Software Inc. 800-804-6299 www.multiactive.com	Formerly known as Maximizer, this contact management company has branched out into e-commerce. A software-based solution, ecBuilder costs \$99 and is available on CD or via download. It is primarily available through ISPs, which sell ecBuilder along with their hosting	Using wizards, ecBuilder walks you through 11 steps to create an online store. There are 30 design templates, each with multiple color options. You enter all product information manually; ecBuilder generates the Web pages, which can be automatically uploaded to your ISP	Off-line transaction processing only. Orders are e-mailed to you. No provisions for shipping.	Provided only by a variety of partner ISPs, though Multiactive offers free hosting for a limited time	The same wizards used to create a store are also used for maintaining the site. Customer information can be organized in Multiactive's contact management program Maximizer, but ecBuilder provides no reporting tools of its own
ONLINE MERCHANT Alpha Software Corp. 800-451-1018, ext. 117 www.onlinemerchant.com	Online Merchant Gold is a software-based e-commerce solution costing \$99.95. Another version, Online Merchant Pro—available later this year—will offer advanced features such as online credit card verification and reporting. Hosting fees vary by ISP	The program includes 50 design templates (which can be modified). You can create not only product categories but also lines of products	This version supports off-line transactions only. The program can notify you of new orders via e-mail. Online Merchant Pro will support credit card transactions	Designed to work with any ISP that can accept Online Merchant's CGI and Perl scripts. Since many ISPs do, this approach lets you shop around for the best hosting deal	The product provides limited reporting capabilities. Unusual features include the ability to create seasonal or holiday promotions
PEACHLINK Peachtree Software Inc. 800-228-0068 www.peachtree.com	A free extension to most of Peachtree's accounting software line, PeachLink lets small-business owners create sites that integrate with their bookkeeping. Hosting is provided by Harbinger Corp. for \$79.95 per month. Optional features, which include a private domain name and other services, are available for a \$150 setup fee	Like ecBuilder, PeachLink offers a wizard and design templates for building your site. You have to enter all product information manually	PeachLink retrieves orders from your site and incorporates the information into your Peachtree accounting system. All order processing takes place off-line	Harbinger Corp. is a major supplier of EDI (Electronic Data Interchange) products. Although Harbinger offers fewer resources than AOL and CompuServe, its hosting is adequate	Integration with the Peachtree accounting system delivers a wealth of sales-reporting options. Harbinger provides monthly site statistics
SURESITE Infinite Systems Ltd. 800-720-5763 www.suresite.com	A hosting service, SureSite costs \$139 for initial setup and \$200 per month. The fee does not include charges for domain name registration (\$70) or VeriSign credit card authorization (\$495 per year). It does, however, include Mercantec's SoftCart for creating catalogs and managing orders	You can create basic pages with any authoring tool, but none is provided. You use SoftCart to generate the catalog pages. If you have a large inventory, you can import product data rather than entering it by hand	SoftCart e-Commerce System was one of the first and is one of the best order-processing systems, but it's not the easiest to use for small business	Although pricey, SureSite provides a very extensive hosting plan. Includes 200MB of disk space and 12GB of data transfer per month. Enterprise-level services include a private CGI bin and 12 e-mail accounts	Administration of the store and site is handled by the customer. Excellent site-statistics reports are provided by a third-party tool, WebTrends
WEB BUSINESS BUILDER IMS 800-833-8082 www.imssoft.com	Another entrant in the category of \$99 software-based solutions, Web Business Builder is used to develop a store that can be hosted by any ISP that will run CGI scripts. This product supports up to 1,000 items	The software includes a WYSIWYG HTML editor for creating the site and catalog pages. Wizards and design templates simplify the process. The software can connect with any ODBC database to import product data.	Inventory tracking is included. Secure online transactions are supported, confirmation numbers are given on-screen after transactions	Hosting services vary depending on the ISP	No administration or reporting features

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SPECintbase rates. All benchmarks are released software (8/96).

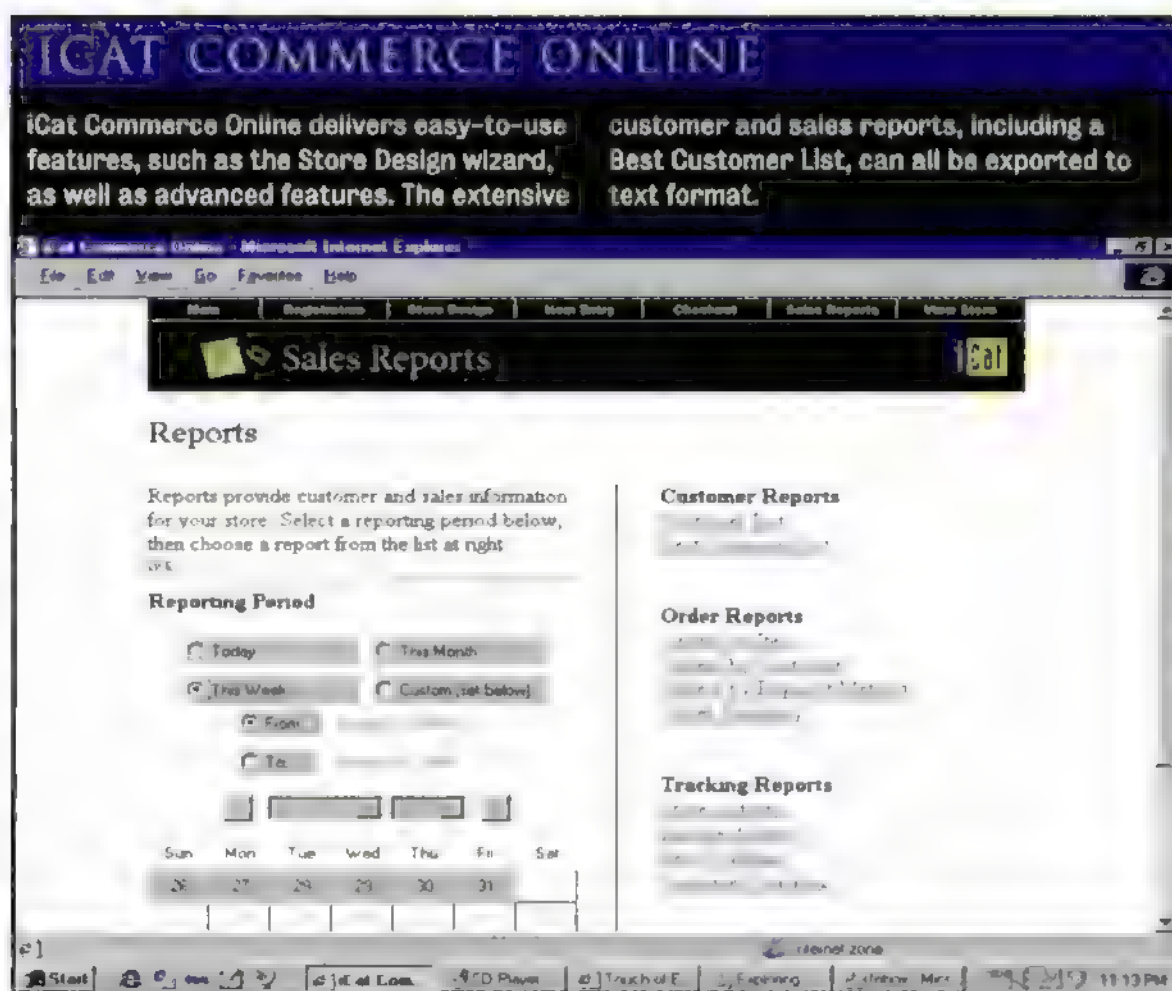
add pages or elements, create your catalog, edit individual pages, move objects around within your page, or access help. Also, by simply clicking on the pages and elements within your tree, you can easily navigate within your store while you're working.

Another valuable feature is HomePage Creator's catalog, which lets you house all your products in a central repository. You can create different sections within the catalog, as well as a seemingly infinite number of fields for your products, though you are provided with a default set that includes SKUs, weight, price, and size. Once database uploads are supported, this component will really shine.

Saving and publishing the store are both one-click operations. You need to have a merchant account, however—either established or via ATS, IBM's payment-processing partner—to take the store live. An ATS merchant account costs \$125 to initiate, plus \$1.00 or more per transaction.

In terms of reporting and analysis, HomePage Creator is undernourished compared with Yahoo! Store and HipHip's MerchandiZer. Neither third-party nor native reporting tools are included with the package, and some essential administration features are also lacking. No shipping and handling or tax calculation features are built into HomePage Creator. Configuring that information is a one-shot deal, which occurs if you set up an order-processing account with ATS. An e-mail message notifies you when orders are received; you then log on to IBM's server to retrieve them. This is not the most flexible system but is an approach shared by other services, including Netcom Small Business Pack.

To be fair, IBM HomePage Creator for e-business is still a youngster, having only been launched in June of this year. HomePage Creator should be a force to be reckoned with, once IBM folds in some of Net.Commerce's advanced functionality. But depending on your needs, you may want to wait until this marriage of features transpires.—*Sarah L. Roberts-Witt*



iCat Commerce Online

Estimated cost for first year (50 products): \$920. iCat Corp., Seattle; 888-289-4228, 206-505-8800; www.icat.com; 503 at www.pcmag.com/infolink.

Best known for its high-end e-commerce solutions, iCat Corp. has ventured into the realm of entry-level e-commerce with iCat Commerce Online. Though this is a storefront creation service geared for small businesses that are new to e-commerce and want a fast and affordable solution, iCat Commerce sports advanced features such as extensive sales reporting and real-time credit card authorization (for a one-time fee of \$249).

With no start-up fee, iCat Commerce is free for up to 10 items and \$49.95 per month for up to 50 items, offering an ideal way for businesses to get their feet wet.

iCat has done a superb job of making your first e-commerce experience a pleasant one. The Store Design wizard offers a wide array of store layouts and page styles, and as with Yahoo! Store, you can build your site in minutes. But you'll want to spend extra time personalizing your store with custom graphics and text.

Most pages have context-sensitive links to the iCat Commerce Online Handbook, which covers everything from designing your site to improving your store's visibility. And at any time, you can use the design wizard to preview your store with different layouts and styles, so you can pick the one that works best for your store later.

iCat also offers numerous value-added services. Its Web site includes e-commerce news, forums, and statistics, and a Developers Network. And you can opt to add your store to iCat's mall, increasing your store's visibility.

With its simplicity, however, comes some limitations. For example, unlike some products, such as Forman Interactive Corp.'s Internet Creator E-Commerce Edition and HipHip Software's MerchandiZer, you can't include any pages other than the ones created by the wizard. In our test store, we were forced to leave out the back-

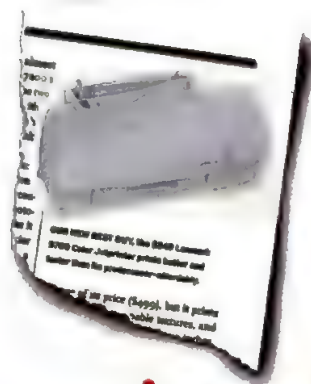
ground information about our merchandise, and we had to squeeze contact information onto the welcome page.

Importing catalog items is straightforward, and the Online Handbook provides step-by-step instructions for creating a tab-delimited file in Microsoft Excel. Items have 12 user-defined fields for storing additional information, and each item can have several companion products that get displayed whenever the item is viewed.

Like Internet Creator and Yahoo! Store, iCat adds several usability elements to the storefront, such as navigation buttons, to provide a smooth shopping experience. An Index icon lets shoppers browse through a list of all items and easily pinpoint products in a certain price range, and the ever-present search option indexes both product names and descriptions.

The product supports tax rates down to the ZIP code level and makes available three levels of shipping with four price points for each. Customers can make payments for goods only by credit card or check, and iCat can configure your site to process credit card orders in real time using CyberCash and your merchant account.

The ordering process is perhaps the most endearing experience of iCat Commerce. As a customer, you register once with the site and iCat recalls your shipping and billing information in the future. When you purchase items, it lets you know if there are any items in your cart and asks if you want to add them to the order. The



PC World
June/August 1998

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Home Office Computing
May 1998

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E-Commerce Solutions for Small Business

Shopping List lets you earmark items to be purchased during a future visit.

Returning customers can check their order history as well as the details and shipping status of orders. They can even click on a UPS or FedEx hyperlink to track a shipment on the carrier's Web site.

On the administrative side, merchants can access order information and update shipping status using the Order Summary report. When updating shipping status, an e-mail confirmation notifies the customer of the change. Orders can be processed individually, or all orders for a date range can be exported to a text file and ported to another system for processing.

Merchants have access to a variety of useful statistical reports in addition to basic customer and order reports. For instance, the Best Customer List shows the top purchasers for a date range, and activity lists can summarize which items are viewed the most or how many times a customer viewed an item before purchasing it. All reports are exportable to text format.

iCat Commerce Online is one of the least expensive options for hosting an e-commerce site, providing a level of usability that even neophytes will appreciate. With a clear upgrade path to the higher-end iCat Commerce Suite, iCat Commerce Online offers a great starting point for merchants wanting to jump into e-commerce.—Greg Alwang

Internet Creator E-Commerce Edition 4.05

Estimated cost for first year (50 products): \$830. Forman Interactive Corp., New York; 800-899-9702, 212-627-4988; www.internetcreator.com; 504 at www.pcmag.com/infolink.

Internet Creator E-Commerce Edition 4.05 from Forman Interactive Corp. teams an advanced WYSIWYG editor and site management solution with SiteAmerica's hosting service. Derived from a full-featured Web authoring program, the E-Commerce Edition provides powerful site design capabilities but lacks such rudimentary features as tax calculation and in-depth sales reporting.

The package costs \$59 per month, with a \$50 setup fee. This includes the Internet Creator software, support for unlimited storage, shopping cart service, and CyberCash, a service for processing real-time transactions with credit cards. The only other fee is your \$70 domain name registration.

Unlike most of the online solutions

Internet Creator keeps the development process simple by using a suite of wizards to guide and automate the development of complex elements for your store. Though prior Web knowledge is an advantage, there is no need to do any HTML or other programming.

We liked the fact that Internet Creator handles many design tasks, such as auto-

matically generating a table of contents and providing two canned CGI scripts (e-mail and survey). And the Form wizard makes creating Web page forms as simple as painting by numbers, though it's not very flexible. The Form wizard is not a WYSIWYG environment, and you can't change the layout of form items. A Server Options wizard is used to set up e-mail and other server-based features such as FTP, newsgroups, search forms, and search engines.

To build the product catalog, you can enter data manually or import it from several file formats. One feature

we really appreciated was the ability to enter a product with multiple options, such as size and color. Whereas some products require you to enter each option as a separate item, Internet Creator makes them a single item with varying options listed at individual prices.

An interactive shopping cart is provided to collect items for purchase. When the customer checks out, shipping options are calculated, but unlike some products in this roundup, tax calculations are not supported. Obviously, this poses a serious problem to merchants doing business in states with a sales tax.

Once an order is completed and the credit card has been validated by CyberCash, an order confirmation pops up on the customer's screen, but customer e-mail notification is not available. Notification can, however, be e-mailed to the merchant. Although Internet Creator maintains a customer mailing list for promotions, there is no ongoing record of customer preferences or order history.

Internet Creator provides Merchant Management System (MMS) for handling



here, Internet Creator begins off-line. You create a site, store, and catalog using Internet Creator's software. This is a seamless process that we found faster than in the online products. An FTP wizard is provided for uploading your files to SiteAmerica. To avoid redundancy, this process is incremental, sending only items that have changed since the last upload.

Because Internet Creator began as a full-featured Web authoring program, it's no surprise that the Commerce Edition provides very strong design and development capabilities. The main interface is a two-pane screen, with the left pane containing an object tree (a hierarchical representation of all the elements on the site, including products in the store catalog) and the right pane containing a WYSIWYG representation of each Web page. This interface makes detailed page design extremely easy to perform. We found that some details didn't work the way we expected, however. For example, when editing text we couldn't apply left or right justification to individual paragraphs. But these were just minor irritations.



FOCUS ON YOUR CUSTOMER

Customer-focused, customer-driven. Over the past decade, the giants of Corporate America have made the customer their strategic centerpiece, investing huge sums in information technology to help them improve their customer relationships.

And, what they've been saying is, 'We have to start treating our customers like small businesses do...with the same personal attention to their needs and the same ability to customize a product or a service.'

While big businesses are using technology to play catch up with companies with one, five, ten, or 20 employees, small businesses all over the world are finding out they can use those same solutions to build their advantage.

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Software solutions can help small businesses serve their customers better than ever, while at the same time helping them improve their own productivity. There are software solutions that not only put the power of information technology at their fingertips, but also protect customers from the problems that systems can cause.

Symantec has spent nearly two decades providing such solutions to individuals, businesses and other institutions around the world, making them more productive and keeping their computers safe and reliable — anywhere, anytime.

"With such revolutionary developments as corporate downsizing, computing and the Internet, the number of small businesses around

you more touch and feel when it comes to your customers?

Understanding

Customer-driven means that a business offers its customers products and services they really need, rather than presenting "a product in search of a market." The price is right; the packaging and shipping is the way they want it; their operation is 24 hours a day, so your support is too. The best businesses are the ones that understand their customers well enough not only to see all this, but also to see what's coming around the bend.

It's never been an easy task. You need to know your customer base by market or geographic segment, but that's not enough. You need to

tools can help you maintain the professionalism and personal touch you've been known for, reminding you and your staff about important customer dates and events.

Responsiveness

Responsiveness on a day-to-day basis says you provide customers with the answers they need when they need them. So sales and service people — no matter where they are — must have instant, easy access to customer databases and the ability to transmit quotes, presentations, and even training programs to customer sites. Access can also be speeded by technology that, for instance, enables caller ID to bring up the record before the sales or service person says "good morning."

It doesn't matter what information your customer needs and how fast, there's a communication vehicle for getting it there and you have to use it all: e-mail, voice mail, fax, overnight delivery. For instance, computer-to-fax is the fastest way to get your customers hard copy. We're talking about hard copy you send from your computer that might contain a just-assembled combination of the latest promotions and product illustrations.

Further, your customers should be able to access your systems to obtain the same information via e-mail or "fax on demand."

Voice mail? It's your image, they say, and technology exists for any size company to make sure you sound right, respond quickly, and keep a record of calls and faxes.

Productivity

Being able to provide your customers with better products and ever higher levels of service, being

Be understanding, responsive, productive and protective. This is what being customer-driven is all about.

the world has exploded," says Symantec's Dana Siebert, VP, Americas. "This is great because small businesses have always been a major source of innovation and service. A primary goal for companies like ours has to be to help level the playing field for them and contribute to their growth.

"What we're saying here is they have an advantage — their understanding of and responsiveness to their customers — and we think we can help them keep it."

The Touch and Feel of Technology

What does it mean to be customer-focused and customer-driven? How can technology give

know your customers individually and they need to feel that you do — that you know their business, you know them as people.

For instance, to create winning proposals over and over again, you want your customer's plans and the history of your relationship at your fingertips. We're not only talking volume, credit history, and the bottom line, but also the nuances of how you have worked together.

Technologically, both the top-down planning and the individual interaction require a customer database: an information file on your customers and their accounts — the notes, the phone discussion logs, the presentations and proposals.

As your company grows, software

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These tools are win-win solutions for the front lines of your business - the people who plan and deliver what the customer needs. You also need technology that protects your business and your customer's, and solutions exist for your back office to provide these safeguards.

The good news is that technology solutions exist to fend off these problems.

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#09 71-00290-A

store administration. MMS allows merchants to access store information, primarily orders, which can be viewed online or downloaded as a file. MMS also offers sophisticated statistical reports, which are among the best in this roundup. Unfortunately, Internet Creator lacks equally sophisticated sales reporting and online inventory tracking.

Internet Creator offers some of the best design tools in this roundup, allowing you to create an attractive shopping environment. But if you're looking for strong store management features, you should look elsewhere.—*NK*

MerchandiZer 2.03

Estimated cost for first year (50 products): \$1,330. HipHip Software Inc., Miami; 800-636-6343, 305-819-8111; www.merchandizer.com; 505 at www.pcmag.com/infolink.



Although it debuted less than a year ago, MerchandiZer is already in its second incarnation. And by the look of things, HipHip Software has clearly done its homework. MerchandiZer is a simple, low-priced solution that will appeal to small-business owners, while offering the power to grow with their trades.

For an initial setup fee of \$149 and monthly hosting fees starting at \$79.95, MerchandiZer delivers support for unlimited items and storage space. And unlike Yahoo! Store, it doesn't require you to have a merchant account to take your site live. Adding a merchant account will cost an additional \$150.

A true strength of MerchandiZer is that it offers a breadth of features while maintaining simplicity throughout the entire process. Like most of the products in this roundup, MerchandiZer is an online-only solution; all that is required to build your online store is an Internet connection and a Web browser. Your site's setup is handled through MerchandiZer's manager utility, where you can select from a number of prebuilt themes and templates as well as add your own graphics to customize your site.

To display your storefront to the world, MerchandiZer makes extensive

use of frames, but you don't have to be an HTML guru to take advantage of this.

The MerchandiZer storefront divides your product line into groups and subgroups, with several levels of grouping available to you. The group and subgroup headers become your navigational links in one frame, displaying the product pages or other HTML pages you create in another, larger frame. This approach makes navigation and shopping on your site very easy, as you can quickly switch from one area of the store to another.

Once you have defined the product groups and subgroups for your store, getting your actual products into the catalog is a fairly simple process. If you have a small catalog, you can enter the products manually, using simple forms that allow you to input detailed information on each item. Although MerchandiZer does not let you import catalogs directly, HipHip

account is especially convenient if you're just getting started with e-commerce. You can test the waters with off-line transactions, and if all goes well, you can add a merchant account and begin accepting real-time credit card transactions whenever you're ready. We like the fact that MerchandiZer incorporates the shipping table for UPS directly into the program, so there's no need to worry about entering shipping tables manually—unless, of course, you want to use another carrier. By default, MerchandiZer is configured to handle sales tax only from your own state. You can set up additional states, but you must know the appropriate tax rates.

For administration purposes, MerchandiZer keeps track of your customers for you, making it easy to see who's shopping at your site. A separate area lets you browse through the catalog and change prices permanently or for special promotions. From the database of customers, you can create mass mailings from within the program.

In addition to sales data, MerchandiZer provides a wealth of site statistics. Rather than amassing all the data on a single HTML page, as in Virtual Spin Internet Store, MerchandiZer creates individual reports on demand. To create a report, you simply select it from a drop-down list.

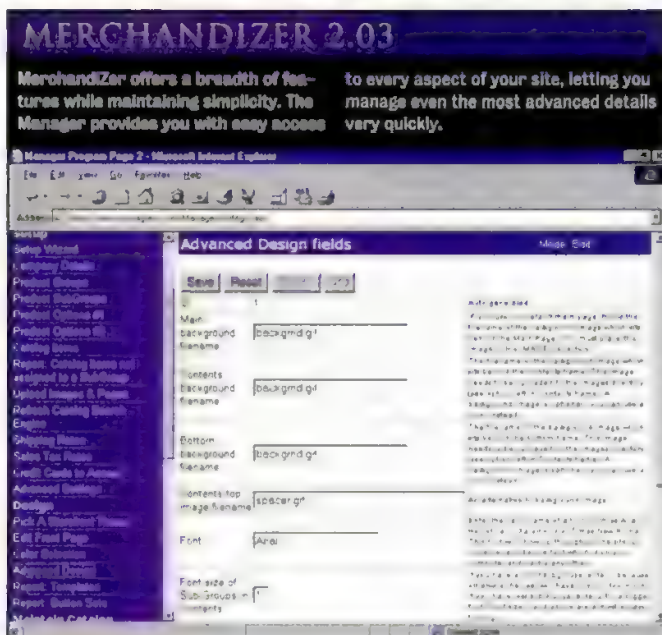
For a very young product, MerchandiZer is surprisingly advanced. It includes nearly all the features you could want—plus a few extras we hadn't thought of—in a single simple package. MerchandiZer is not

just the rookie of the year but also the new product to beat in this category.—*Heath H. Herel*

Netcom Small Business Pack

Estimated cost for first year (50 products): \$1,470 (including upgrade to SubSite Manager). Netcom On-Line Communication Services Inc., San Jose, CA; 800-638-2661, 408-881-2000; www.netcom.com; 506 at www.pcmag.com/infolink.

Built on Netcom's soup-to-nuts hosting service, Netcom Small Business Pack is a service of one of the largest national ISPs. For designing and managing your store, it includes a variety of third-



Software has come up with a good solution for larger businesses. The company will provide you with a preformatted Microsoft Access database, which you can simply import your data into and then send back. HipHip Software will then copy the data to its server for you.

Catalog searching is provided by default, and you can control which fields in your catalog the search engine indexes. When your catalog is updated, MerchandiZer provides a link that will update the search engine to reflect any changes.

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E-Commerce Solutions for Small Business

party tools such as Open Market's ShopSite Manager Lite. This approach offers a lot of flexibility and power but demands more expertise and setup time than integrated solutions. The service also does not support real-time transactions or product-database imports. Small-business owners who already use Netcom as an ISP and don't mind delving into third-party tools will like Small Business Pack, but others will be better off with a more integrated solution.

Costing a one-time \$125 setup fee and \$69.95 per month, Netcom Small Business Pack includes five pages, 50MB of storage, 2GB of bandwidth, and supports 25 prod-

package from Netcom Business Center. After you've selected a hosting solution, you choose a domain name; Netcom automatically registers your domain name with InterNIC as part of Small Business Pack. Next you move to the Maintenance section, from which you can jump to ShopSite Manager Lite to begin creating your site.

Along the way you are exposed to a treasure trove of resources. The Client Resources page includes a library filled with information on the Web and Web development, an Internet software toolbox, and a listing of newsgroups and related links, as well as extensive Netcom help.

Hardly a template-driven, WYSIWYG

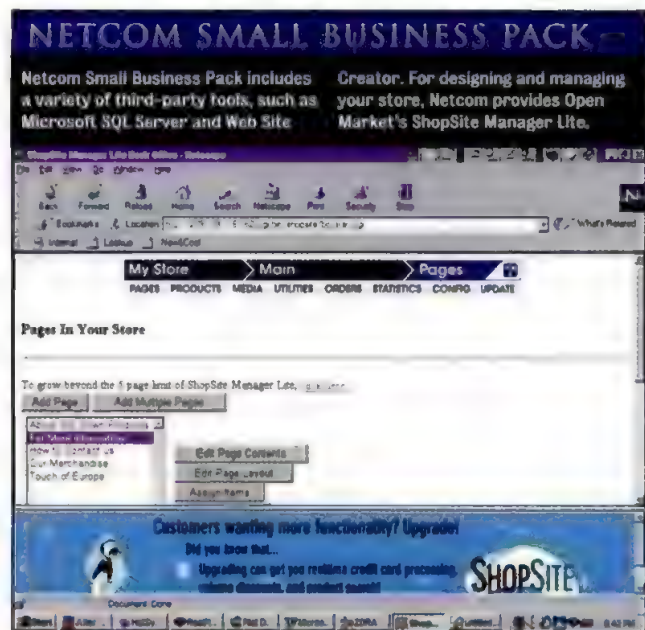
tool, ShopSite Manager Lite is not nearly as congenial as IBM's HomePage Creator or Yahoo! Store. It really requires a knowledge of HTML to get the most out of Small Business Pack, but if you are not afraid to do some hand coding, ShopSite Manager Lite will provide you with more flexibility than template-based tools. And you can always use a separate WYSIWYG tool (albeit at an additional cost), because Netcom Small Business Pack

supports both Adobe PageMill 2.0 and Microsoft FrontPage extensions.

We had no problems manually entering our test products into ShopSite Manager Lite, but the package does not support database uploads. Larger businesses might want to consider another solution that does support this feature.

As with IBM's HomePage Creator, the merchant is notified of orders by e-mail. And you can download orders in a tab-delimited format to import them directly into a database.

When it comes to shipping and taxation, this product falls behind the pack. We found these features of ShopSite Manager Lite difficult to use, and the product could certainly benefit from a walk-through wizard similar to that found in Yahoo! Store, especially in view of



ucts, which is comparable to the content of other products here. Unlike most of the packages we looked at, Small Business Pack includes domain name and search engine registration with no extra charge, and ten POP e-mail accounts.

Aside from ShopSite Manager Lite, you get Microsoft SQL Server, Web Site Creator, and many other third-party tools. Conveniently, bandwidth and storage can be incrementally added for a cost, and you can upgrade to the beefier ShopSite Manager or ShopSite Pro for a one-time fee of \$495 or \$1,295 respectively. ShopSite Manager adds support for 50 products, database uploads, and real-time translation processing.

Setup is somewhat different from that of most of the other products reviewed here. You start by selecting a hosting

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E-Commerce Solutions for Small Business

Small Business Pack's eponymous audience. Netcom Small Business Pack does not support real-time credit card transactions, but you can upgrade to ShopSite Manager (\$495) to get this functionality.

Native reporting and analysis tools are minimal. The software generates basic sales statistics (number of sales, dollars, and units for the day, month, and year). Yet the real reporting power comes from a popular third-party analysis and reporting tool, Virtual WebTrends, which is included with Small Business Pack. As for administration, you can access your site via the Maintenance section or by holding onto the long URL that will let you leap directly to the management interface.

Netcom Small Business Pack gives you a lot for the money, but ultimately, the whole is less than the sum of its parts. Other products reviewed in this roundup offer more features in a better-integrated package.—SLRW

SecureMerchant 2.0

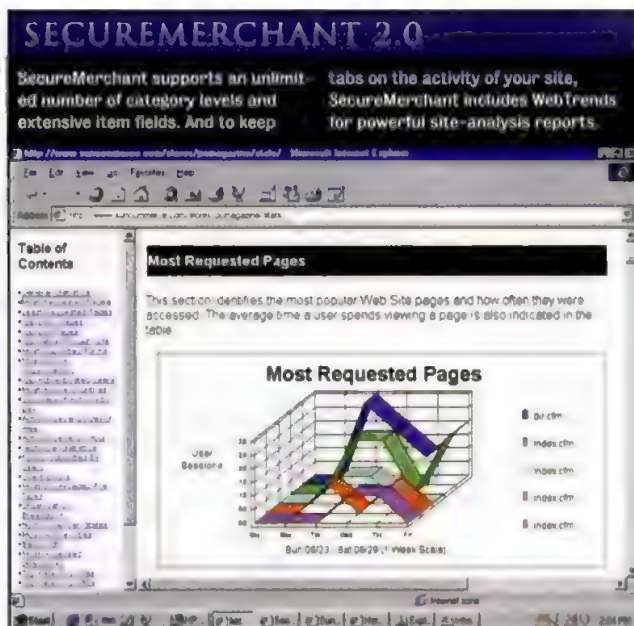
Estimated cost for first year (50 products): \$1,170. SunCommerce Corp., Vancouver, Canada; 877-478-6266, 604-801-6097; www.suncommerce.com; 507 at www.pcmag.com/infoink.

Billed as the "five-click store," SunCommerce Corp.'s SecureMerchant 2.0 is designed for small businesses that want to get up and running quickly. An online-only solution, SecureMerchant does indeed deliver on this promise. But it does so at the expense of some higher-end features, such as sophisticated order processing, that are important even to many smaller businesses.

For \$99.95 per month and no setup fee, SecureMerchant lets you create an intuitive store interface and a product catalog with as many as 250 items. It includes 5MB of additional storage and six e-mail accounts, so you can use it for a general company Web page as well.

All of the site design is done within your browser using a set of templates.

Using the Store Properties wizard, you can customize your site with images, colors, and text for headers and footers. You don't need to know any HTML, but it helps if you want to spice up your site by adding HTML tags to text areas. For



instance, we added font attributes, images, bookmarks, and hyperlinks to our test site. We also used HTML to customize the single free page provided by SecureMerchant with links to other areas of our site, such as About Our Store, About Our Products, and How to Contact Us.

Though you can't control the look and feel of the site, SunCommerce has done a good job of designing an intuitive shopping interface. A Search box appears on every page so customers can easily search for any items in the catalog. And a navigation area lists the product categories and always indicates the user's current location in the catalog, so customers can browse without getting lost. To add more functionality to the site, you can purchase plug-ins (\$19.95 per month each) for ad banners, information request forms, and mass e-mailings.

SecureMerchant supports an unlimited number of category levels and extensive item fields that cover all the bases of a simple online store. For example, you can enter up to four different prices for each item including cost, suggested retail, list, and special. When a customer views an item, SecureMerchant automatically displays the regular price, today's list

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price, and the savings to the customer.

The most cumbersome step during setup was entering products into the catalog. Like Commerce Made Simple, SecureMerchant does not have an import function, so you must enter all products manually. (SunCommerce will enter them for a fee of \$75 per hour.) Because SecureMerchant requires a secure HTTP link, this process can be slow, even over a high-speed connection. If you have more than a dozen products, set aside a couple of hours.

Though most of the data-entry process is self-explanatory, you don't get much help along the way. When you enter items, information is validated at the form level rather than the field level, so if a value gets rejected, you must figure out which value to change on your own. For example, we found creating options for different colors or styles confusing, but after calling tech support, we had no trouble setting this up.

The shipping tables support a base shipping cost and a per-weight calculation. In addition, you can add as many as three sales tax rates and one shipping tax for each state. This affords flexibility when dealing with various tax rates.

When a customer is placing an order, SecureMerchant asks for an e-mail address and password. A new customer at your site fills out a detailed customer form for entering billing and shipping information. But SecureMerchant remembers repeat customers.

Inconveniently, SecureMerchant requires that all orders be processed manually. When orders are placed, they are stored in a database. The merchant can access one record at a time; there's no export option. These limitations mean SecureMerchant is suitable only for businesses that receive at most a few orders per day. Orders can be paid for using check or credit card, but real-time credit card authorization is not supported. (SunCommerce will process credit card transactions for a 5 percent fee.)

Sales reporting and analysis are very basic. You can see the number of views of a product or the total sales for a date



range. Like Netcom Small Business Pack and Virtual Spin Internet Store, SecureMerchant includes WebTrends for general site reporting.

What SecureMerchant offers is well implemented, but it is missing too many major pieces. Other products, such as HipHip Software's MerchandiZer and Yahoo! Store, will give you more room to grow.—GA

ShopBuilder 2.5

Estimated total cost for first year (100 products): \$1,470. NetVentures Inc., San Francisco; 800-989-7315, 415-752-4000; www.shopbuilder.com; 508 at www.pcmag.com/infolink.

NetVentures provides a single-source e-commerce solution for small businesses, which offers both hosting and its own software: ShopBuilder 2.5. Geared toward beginners, ShopBuilder can help you create a handsome storefront from prefabricated parts without requiring any knowledge of HTML. With a starter package that costs \$20 per month and no setup fee for five items, NetVentures is clearly targeting businesses that want to experiment with e-commerce. But if you have more than five items, the hosting fee jumps to \$70 per month (up to 100 items). For those who are just experimenting with a few products, there are even less costly options here. All others will want a more full-featured solution.

To set up a store in ShopBuilder, you

simply follow a guided procedure. This creates a fixed number of pages for the site (home, catalog, contact, and store information). You can add an unlimited number of custom pages. Unlike the other software-based solution we tested (Forman Interactive's Internet Creator), ShopBuilder is not a true WYSIWYG authoring tool; all site design is done within the wizard. You can choose from a variety of style templates, however. There are currently 11, but more are in the works, and you can add your own text and graphics. In Version 2.5, NetVentures added an HTML editor and a degree of customization is possible, but you don't have as

much control over the layout as you do with Internet Creator.

The catalog pages are attractive and easily organized by category. There is no product search capability, however, and we found the navigation buttons generated by ShopSite ineffective at helping us browse the product catalog. Depending on the size of your inventory, these limitations may or may not be major issues.

Entering product information into the store catalog is a manual task; there is no capability to import data from database files. Again, this should not be a problem if you have only a few items.

Once a customer goes to the checkout page to place an order, ShopBuilder calculates taxes and shipping charges. Tax and shipping tables are typically entered when the store is created. Following a



SUMMARY OF FEATURES

E-COMMERCE SOLUTIONS FOR SMALL BUSINESS



■ YES ■ NO □ OPTIONAL

	Commerce Made Simple	IBM HomePage Creator for e-business	iCat Commerce Online	Internet Creator E-Commerce Edition 4.05	MerchandiZer 2.03	Netcom Small Business Pack	SecureMerchant 2.0
General							
Hosting	SimpleNet	IBM	iCat	SiteAmerica	HipHip-NT/SQL Host	Netcom	SunCommerce
Online or PC client	Both	Online	Online	PC	Online	Online	Online
Technical-support number	619-881-3099	Not available for publication	206-505-8815	800-899-9703	305-821-0922	888-638-2669	877-478-6266
Hours (eastern time)	Noon-midnight M-F	8:00-8:00 M-F	Noon-8:00 M-F	10:00-8:00 M-F	8:00-7:30 M-F	24 hours, 7 days	11:00-10:00 M-F
Estimated cost for first year (50 items)	\$1,880	\$990	\$920	\$830	\$1,330	\$1,470 (including upgrade to Shop- Site Manager)	\$1,170
Store Design Tools							
Includes Web page authoring tool	■	■	■	■	■	■	■
Includes style templates	■	■	■	■	■	■	■
Uses wizards	■	■	■	■	■	■	■
Can create forms	■	■	■	■	■	■	■
Can import data files	■	■	■	■	■	■	■
Supports unlimited product categories	■	■	■	■	■	■	■
Offers product searches	■	■	■	■	■	■	■
Can create navigation controls	■	■	■	■	■	■	■
Can add additional pages to site	■	■	■	■	■	■	■ (one page)
Supports individual product promotion	■	■	■	■	■	■	■
Supports site promotion	■	■	■	■	■	■	■
Can update site automatically	■	■	■	■	■	■	■
Order Processing							
Provides shopping cart	■	■	■	■	■	■	■
Calculates tax	■	■	■	■	■	■	■
Calculates shipping	■	■	■	■	■	■	■
Performs credit card validation	■	■	■	■	■	■	■
Can accept credit card/check or money order	■	■	■	■	■	■	■
Can accept Internet Check	■	■	■	■	■	■	■
Retains customer information	■	■	■	■	■	■	■
Retains session information	■	■	■	■	■	■	■
Inventory tracking	■	■	■	■	■	■	■
Offers SSL or other security	■	■	■	■	■	■	■
Provides customer e-mail confirmation	■	■	■	■	■	■	■
Provides merchant e-mail notification	■	■	■	■	■	■	■
Can review orders online	■	■	■	■	■	■	■
Can search/filter orders	■	■	■	■	■	■	■ (by date only)
Administration and Reporting							
Offers secure administration module	■	■	■	■	■	■	■
Can create sales reports	■	■	■	■	■	■	■
Can create site reports	■	■	■	■	■	■	■
Can export data files	■	■	■	■	■	■	■

purchase, the customer's order is confirmed by e-mail and the merchant receives e-mail notification and a fax of credit card information. Orders can also be automatically faxed or viewed online.

In Version 2.5, NetVenture added to ShopBuilder support for real-time transaction processing, including credit card verification using the PaymentNet service. Designed for small businesses, PaymentNet (\$250 setup fee) offers four

pricing models based on the volume of transactions.

ShopBuilder provides a searchable list of customers and orders, and the program can track inventory on a per-item basis. We particularly liked the ability to set the maximum number of units of an item that can be purchased at one time. This can help deter fraud or simply prevent somebody from cleaning out the inventory.

To manage the store, ShopBuilder pro-

vides a password-protected, online administrative module that is easy to use and fairly comprehensive, though it lacks some refinements. The package provides one handy report that combines site activity and product sales, which can even be produced as a graph. Nevertheless, this is not an ample substitute for a full suite of reports, such as those provided by HipHip Software's MerchandiZer or Yahoo! Store.

The next version should address some

Virtual Spin Internet Store 4.5

ShopBuilder 2.5

Estimated cost for first year (50 products): \$400. Virtual Spin Corp., Bellevue, WA; 888-853-5600; 425-974-1100
www.virtualspin.com; 509 at www.pcmag.com/infolink.

Having started out a strong contender in our last feature on small-business e-commerce solutions, Virtual Spin Internet Store (formerly Cartalog) has further improved with age. A wizard-based solution, Internet Store can lay the basic foundations of your store via a Web browser in less than an hour. Aside from a few omissions, Internet Store is also a relatively full-featured solution, but to get the most out of its more powerful features, you'll have to know some basic HTML. More-experienced users may find Internet Store a great value, but novices should spend the extra money for a solution that offers similar features in an easier-to-use package.

By far the least costly solution we tested, Internet Store has no setup fee, and the monthly hosting is \$29.95 a month. Including the \$70 fee for domain name registration would bring the first-year total for our 50-item test store to \$400, less than half the price of nearly every other solution reviewed in this roundup (except Forman Interactive's Internet Creator, at \$830).

Basic setup of your storefront is handled through a series of interactive wizards. Internet Store collects basic information about you and your business and generates the backbone of your site within minutes. Templates are provided to set up your home and feedback pages. The storefront is customized to whichever browser a visitor is using (to take advantage of the more advanced features of Microsoft Internet Explorer and Netscape Navigator).

Once you have gone through the initial setup, you are free to make changes throughout the site, customizing it completely to suit your needs. You can enter text in several areas, and you can embed HTML in any of the text boxes to customize the site further beyond the templates. The text boxes are limited to 255 characters in almost all instances, which we found restrictive at times. To go beyond this, you have to upload your own HTML and write the necessary hyperlinks in the text boxes. This is certainly a workable solution, but it may prove frustrating for novice users.

Once the basic pieces are in place, cre-

ating the store itself is very simple. By creating category pages, Internet Store provides you with the various product groups for your store. As you add products, you place them in the appropriate categories. The categories appear in a drop-down list on your store's page, allowing the shopper to navigate to any category quickly. The design of the category pages is not spectacular, but you have several layout options, so you can customize each category to suit your particular needs.

Adding products to the catalog is a straightforward process. You can easily enter product information manually through the browser interface, or you can upload your data as an ASCII file. Internet Store gives you the format required for this file.

During testing, we noticed a troubling discrepancy between the prices of products in our database and in the actual catalog. The correct prices appeared in Internet Store's database and in the shopping cart, but they were not always displayed correctly on the category pages in the catalog. If this is a persistent problem, it will obviously have a big impact on the customer's experience.

Internet Store is tightly integrated with CyberCash for free credit card verification and payment processing, making it easy to set order processing. All the tax tables are already completed, so to set up sales tax calculations, you just tell Internet Store what states and localities you anticipate doing business in; it takes care of the rest. You still have to enter the data in the shipping tables, but we found the process to be both easy and flexible. When an order is placed, Internet Store sends detailed confirmation messages to both

of ShopBuilder's weaknesses, but for now it remains a program without a niche of its own. For those who are just looking for a low-cost way to try doing business online, iCat Commerce Online offers more features and is free if you have fewer than ten products. But in case you're looking for a more robust solution that gives your store room to grow, you'll most probably be better off with MerchandiZer or Yahoo! Store.—NK



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the customer and the merchant.

Other back-office features were not as impressive. Internet Store provides little in the way of customer tracking or personalization. There's little in the way of administrative tools for creating sales promotions or discounts. And although Internet Store's reporting provides a treasure trove of data on your site, the information is all crammed onto a single Web page with links for drilling down to specific reports. This makes it easy to get all of your reports at a glance, but the sheer size of this lengthy report would make retrieval via a dial-up connection a time-consuming process.

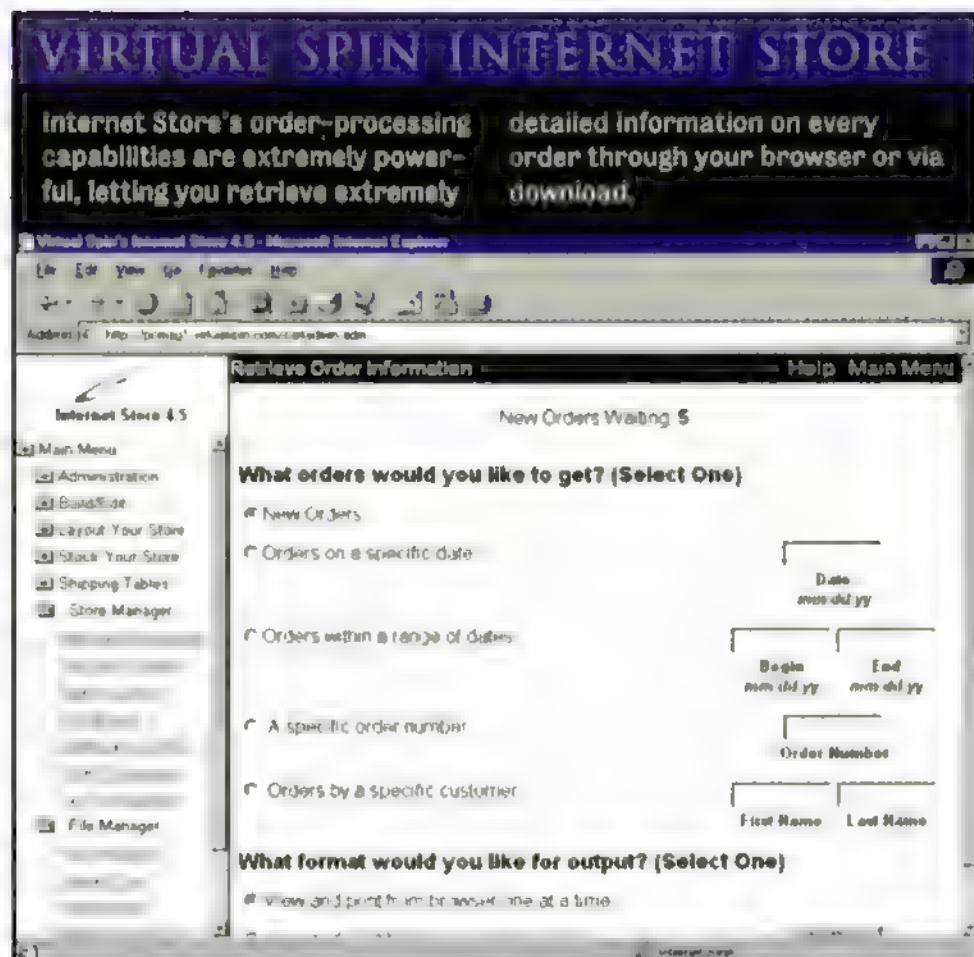
Virtual Spin Internet Store has nearly all the parts you need, but the whole product is not quite as elegant as other online-only solutions, such as HipHip Software's MerchandiZer or Yahoo! Store. Nevertheless, it is a promising product, and for those who are especially price-conscious, Internet Store is a great bargain.—HHH

Yahoo! Store

Estimated cost for first year (50 products): \$1,200. Yahoo! Inc., Santa Clara, CA; 408-731-3300; store.yahoo.com; 510 at www.pcmag.com/infolink.

If you were a fan of Viaweb Store—last year's low-end e-commerce Editors' Choice—you'll be relieved that in its latest incarnation, as Yahoo! Store, the product is even better. Primarily geared toward small "mom-and-pop" and midsize businesses, Yahoo! Store is both extremely easy to use and powerful. Although it has lots of new competition, most notably HipHip Software's MerchandiZer (which edged it out this year), Yahoo! Store remains a top product in the category. (Softbank, the majority stockholder of Ziff-Davis, *PC Magazine's* parent company, is also a shareholder of Yahoo!)

You can try Yahoo! Store's ten-day test drive free, and then if you decide to sign up, the service will cost you \$100 a month for a store with as many as 50 items or \$300 a month for a store with as many as 1,000 items. The price includes the cost of registering your domain name with InterNIC and registering your search engine. Unlike several of the solutions



reviewed here, Yahoo! Store has no setup fee. Furthermore, you can pack as much as you want into your store, because there are no storage or bandwidth limits.

But there are some hidden costs. To take your store live you will need to have an established merchant account, just as

you do with IBM's HomePage Creator. And if you plan on offering real-time credit card processing, you'll need to establish a CyberCash account.

After you choose an account ID for your store and a password, Yahoo! Store takes you through its test drive, which lets you set up the basic pages of your store, explains the commands, and lets you enter an item or two. Though Yahoo! Store claims that you can get up and running in 10 minutes, of course you'll need a little more time for truly fleshing out your storefront. It took us close to 4 hours to get our store operational. The only snag we encountered occurred when we attempted to

load our database of products into the store. We discovered the hard way that the data fields in your product database must exactly match those in Yahoo! Store's catalog to complete the import successfully. Fortunately, we were able to undo the mess via the one-time revert fea-

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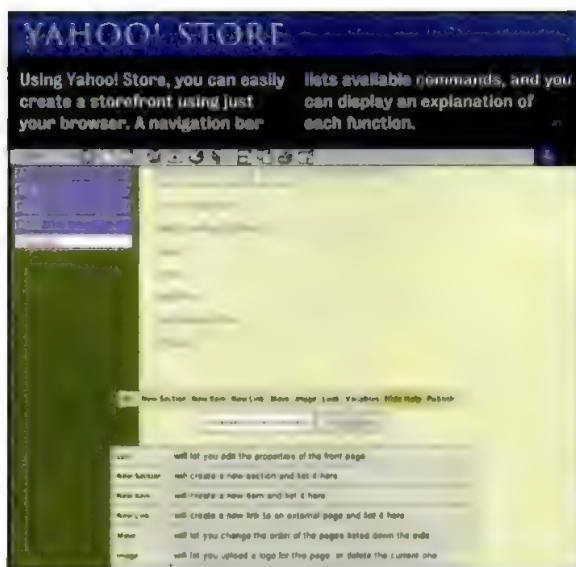
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ture, and we then manually entered the product information.

After you finish the test drive, you can return to your store as a manager and play around with the design, add more items and information, and take care of other chores. Yahoo! Store's interface makes this a no-brainer. A navigation bar listing the commands is displayed across the bottom of the page, and if you choose you can display a description of each command.

Once you've mastered the simple and regular WYSIWYG editing interfaces, you can try out the advanced interface, which allows for more design control and flexibility. If you need more detailed help during construction and configuration, you'll find Yahoo! Store's online manual a terrific resource, though we wish it were integrated more smoothly into the storefront creation software and management interface.

Once you've created your online store, you'll need to concern yourself with orders,



shipping and handling, and taxes. Yahoo! Store makes all of this almost as easy as assembling your storefront, though perhaps not as fun. Through its management interface, you can determine whether you would like your orders e-mailed or faxed to you, or you can retrieve them via a Web browser. And you're presented with a vast

array of acceptable payment methods, including credit cards. Yahoo! Store's automated wizard steps you through creating shipping tables, determining how you want to charge for shipping, and choosing your delivery methods. Taxation is handled in similar fashion. And when you're done, Yahoo! Store lets you test out the whole thing.

Once you're up and running, you can watch the traffic using Yahoo! Store's rich reporting and analysis tools. Slice your daily statistics any number of ways, determining the most popular pages, the sites from which your visitors hail, and the search keywords generating the most sales. You can also generate a report

that summarizes trends on your site.

Yahoo! Store is a terrific e-commerce tool and service for small and midsize businesses. With tough competitors such as iCat Commerce Online and MerchandiZer, Yahoo! Store is no longer alone at the top, but it deserves serious consideration.—SLRW/PC

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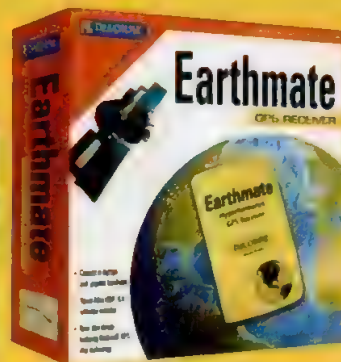
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Net Tools



Your *Private* Internet

A virtual private network provides your data with safe passage through the Internet, saving you plenty on connection charges.

By Frank J. Derfler, Jr.

The saying "Cheap is good, but free is better" sums up the predominant Internet attitude, and virtual private networks (VPNs) fit right in. A VPN drills an encrypted connection through the Internet, giving your organization private use of the public network. VPN technology works either between two (or more) LANs or between a LAN and mobile employees. Of course, a VPN solution isn't really free. Though the cost issues are complex and unique to each company, VPNs offer significant cost savings over private leased lines

and on long-distance phone bills.

The VPN market has taken off this year; our research uncovered more than 15 vendors offering either hardware-based devices or software-based products that run on dedicated servers. We tested a representative mix. These included four hardware products—Internet Devices Fort Knox Policy Router, RedCreek Ravlin 10, Shiva Lan-Rover VPN Gateway, and TimeStep Permit Enterprise VPN Solution—and two software products, Check Point VPN-1 Gateway 4.0 and Microsoft PPTP (a VPN solution built into Win-

INSIDE

CHEAPER CONNECTIONS:

Compared with traditional remote-access servers, a VPN can save you big bucks on long-distance Internet access charges. Senior networking editor Frank J. Derfler, Jr., leads our team review of six hardware and software VPN products.



TIVOLI ON A BUDGET: Long a major player in the enterprise management space, Tivoli debuts its first midrange package, IT Director. Contributor Arie Moller takes a close look to see if it lives up to its lineage. *Page 227.*

NEW HIGH-END: After many delays, the Intel Xeon processor is finally shipping in bulk, bringing its smoking performance to high-end servers. ZD Labs' Steve Bueller and Stephen Chan put the Compaq ProLiant 6000 and the Micron NetFrame 6200 through their paces. *Page 227.*



ONE CARD DOES IT ALL:

The Nova Web 2001 uses a proprietary NIC with an on-board modem and a four-port hub to let you create an Internet-connected network. Find out whether contributing editor Steve Rigney thinks it matches traditional solutions. *Page 232.*

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Net Tools

VPNs

dows NT 4.0). For a list of vendors, see the version of this story posted at our Web site (www.pcmag.com). With the exception of PPTP, these products cost from \$6,500 to nearly \$12,000 (list) for 100 clients.

At PC Magazine Labs, we devoted more than six weeks to testing VPNs. What did we find? VPNs are extremely complex systems that require expertise to set up and maintain. With the exception of the Policy Router (our Editors' Choice), each product took several days to get up and running, with on-site help from the vendor. Most VPN vendors recommend that you enlist a VAR, or value-added reseller, to help.

Our recommendation? First, get your feet wet by initiating a VPN pilot program.

This strategy lets you scope both the management burden and the benefits economically. PPTP is a good candidate, or in case you want to explore using private-key encryption (PKE), Shiva's VPN Gateway provides a good certificate authority (CA). After the initial trial, you should also consider an alternate path—subscribing to VPN services from an ISP. Issues of security, staff support, and reliability make outsourcing attractive. (See our sidebar "Virtual What? Just Give Me a Secure Connection.")

TOUGH TRADE-OFFS

The lure of a VPN is cost savings. Most products here could pay for themselves in a few months, particularly if used to replace international circuits (see the addresses in the box above). But trade-offs in reliability, security, and management must be weighed carefully. Though leased lines are expensive, they provide unparalleled safe and reliable data transport.

The downsides of a VPN solution are somewhat subtle. Internet glitches may result in unaccounted-for delays or a sudden loss of all connectivity, with no one to hold responsible. Moreover, a well-traveled VPN carries a considerable daily administrative burden that involves moving, adding, and changing users and creates the need for subadministrators in personnel, accounting, facilities, and IS departments.

It takes special skills to meet the problems of security and reliability in Internet connections. We think that managing your own busy corporate VPN with a few hundred users can occupy one skilled person full time and require the assistance of other administrators. If you run a round-the-clock operation, you'll need additional support.

TAKE THE TUNNEL

A large part of a VPN's complexity involves security. In short, there are three kinds: data encryption, user authentication, and access rights. The tunneling method between end points is separate from but closely linked to security. Tunneling protocols encapsulate data to handle addressing and improve the chances of delivery. The

Point-to-Point Tunneling Protocol (PPTP) encapsulates both IP and IPX packets.

The IP Security (IPSec) protocol is developed by the Internet Engineering Task Force (IETF). IPSec is a do-everything tunneling and security protocol for IP. Many parts of IPSec are evolving,

but the International Computer Security Association (ICSA) is promoting product interoperability through certification of certain IPSec functions. (For a list of VPNs that are ICSA-certified for IPSec, go to www.icsa.net.) In a perfect world, interoperability would let you use equipment from any manufacturer on either end of the link—something that isn't practical today.

HOWMUCH

will a VPN save you? Bay Networks and Shiva each provide calculator utilities that show your return on investment (ROI). Find them at www.Baynetworks.com and www.shiva.com/remote/vpnroi.

If you rely on AppleTalk or IPX, consider products that use the Layer Two Tunneling Protocol (L2TP), a multivendor design that

combines PPTP with an earlier effort from Cisco. L2TP encapsulates AppleTalk, IP, and IPX packets.

The products we tested use either PPTP or IPSec. Neither protocol designates a specific encryption scheme, but Microsoft includes RC-4 encryption in Windows NT, conforming to U.S. export laws. And more powerful 128-bit encryption is available for download in North America. IPSec isn't mature, but it's getting plenty of growth hormones. Among these products, TimeStep's has the most mature IPSec implementation.

KNOW THINE ENEMY

If your VPN plans involve many hundreds of users across multiple companies and divisions, you'll want to select a system that provides IPSec-based certificate authentication. (The sidebar "Let's See Some ID!" provides a closer look.) But smaller groups can safely ignore standards-based certificates. Shiva's certificate system was easy to use, and CheckPoint, Shiva, and TimeStep offer the Entrust certi-

EDITORS' CHOICE

• Internet Devices Fort Knox Policy Router



If a sizable chunk of your budget is devoted to a leased-line service for connecting remote users, make no mistake: You want a VPN. But businesses—the smaller

ones in particular—will always demand ease of setup and use, regardless of a product's complexity. The only VPN product we tested that was able to meet these demands was the Internet Devices Fort Knox Policy Router (\$4,990 list).

Unlike most other products, this hardware-based device didn't require several days and the help of a VAR to set up. And it provides rich features, such as a full firewall implementation, and optional features including DNS and Web-page caching, URL filtering, and bandwidth management—all unique to these products.

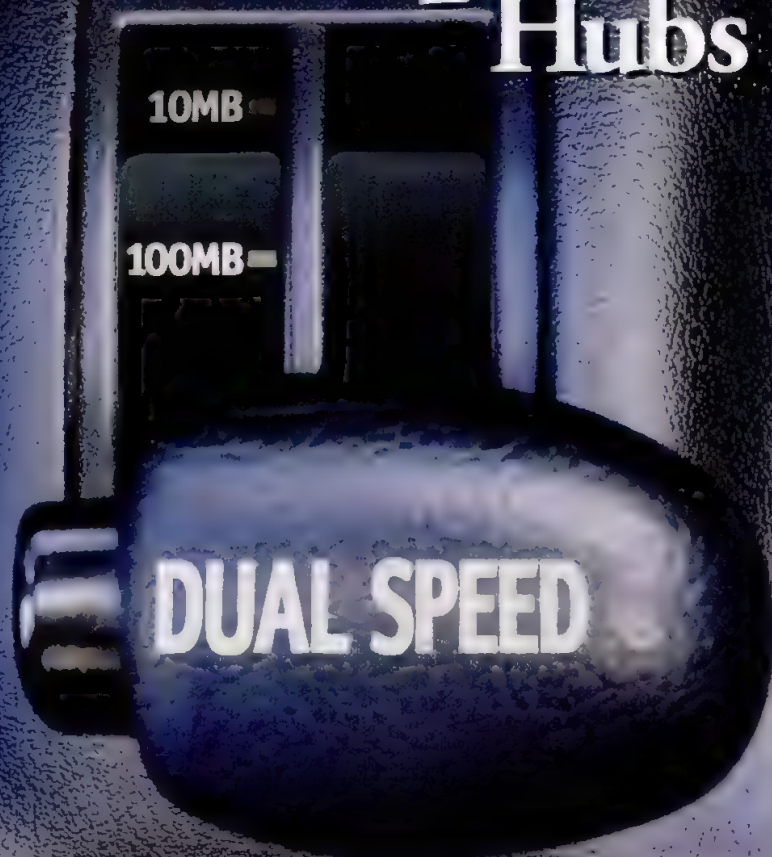
The Web-based management interface was intuitive to use, letting us configure and manage multiple features from a single location. Logging was extensive, and the remote client software was simple to

download directly from the device. Though the Policy Router doesn't include support for digital certificates, smaller organizations are less likely to need them today.

The Microsoft PPTP (free as part of Windows NT Server 4.0) earns an honorable mention. If it suits your needs, the PPTP is a fine VPN. It's low-cost and relatively easy to set up and use. And it's good for Windows NT shops that don't require certificate support or data encryption stronger than RC-4.

If you're formulating an ambitious VPN vision for a large company built on IPSec and certificates, look to the TimeStep Permit Enterprise VPN Solution. TimeStep's IPSec implementation is the most evolved we saw, and its hardware-based encryption helped it deliver the best performance.

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cate system. The Internet Devices, Microsoft, and RedCreek products don't yet work with certificates, though all the vendors are moving in that direction.

Data encryption can take significant processing power, as our performance numbers demonstrate. The trick is to employ the appropriate level of encryption to meet the security threat. For example, a retailer could send perishable order and inventory data unencrypted or use RC-4. If you're unsure, judge your encryption needs by the resources of your enemies. For example, invoking Data Encryption Standard (DES) encryption will cost over one million dollars for your enemies to intercept and decrypt your files and e-mail. If this sounds within the realm of possibility, then use stronger encryption. Triple DES raises the cost of interception and decryption exponentially.

The information found in the following reviews and sidebars will help you select the best VPN strategy for your company.

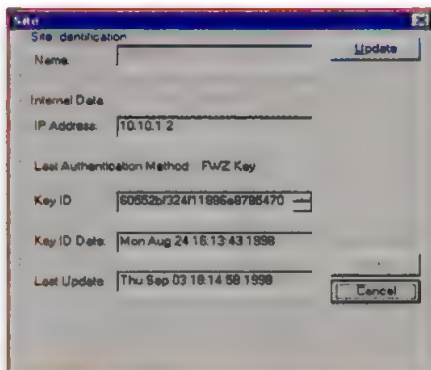
Check Point VPN-1 Gateway

List price: \$3,495; tested configuration, \$8,495. Check Point Software Technologies Ltd., Redwood City, CA; 800-429-4391, 650-628-2000; www.checkpoint.com. 900 at www.pcmag.com/infolink.

● One of only two software-based products in this roundup, the Check Point VPN-1 Gateway 4.0 integrates easily with the company's market-leading FireWall-1, as well as its FloodGate traffic manager. On the whole, we found the VPN-1 well rounded and easy to use. Unfortunately, performance was slower than with most products here, and testing problems discourage a full recommendation. But if you are (or plan to be) a Check Point customer, the VPN-1 deserves consideration.

You'll also want to add the accelerator card (\$3,995 list) to your system, available by the time you read this.

The VPN-1 was the only product we tested to run on Sun's Solaris operating system as well as Windows NT. Though we contend that dedicated hardware devices are more reliable and secure, the Solaris and Windows NT hardware platforms are highly scalable. In particular with Solaris, though, the hardware doesn't come cheap. The Sun box on which we tested VPN-1 costs \$24,415. Check Point also has a hardware-based device, called the VPN-1 Remote Link, which is targeted at branch offices. It began shipping recently but missed our testing deadline.



CLICKING ON UPDATE downloads information onto the site screen.

The VPN-1 provides excellent security features and works with the Entrust certificate authority out of the box. Though it lacks its own bundled certificate manager, Check Point expects to release an Entrust-based CA (\$20 per client) with the next release. You can also hook the product into a RADIUS server.

Net Tools

VPNs

Setup was complicated, taking over two days to complete with the vendor's help. (Don't try this install without a VAR.) We found

the management interface easy to use, though it could benefit from some tweaking to ease navigation. For instance, the screen for setting the encryption type was six layers deep. User management was straightforward, and if you need to get a view of what the firewall is doing with each packet, the log is an excellent tool—color-coded and easy to decipher.

Check Point's SecuRemote client software was simple to install. But we found that after changing the VPN key or topology on the server side, we also had to update the client manually to reflect the changes. It would be far better if the update were performed automatically, as in some other products such as Shiva's VPN Gateway.

Unfortunately, the product exhibited some glitches. We configured the FireWall-1/VPN-1 to pass all ICMP traffic to use the ping function for testing our setup. But it blocked pings continually on a number of occasions. Also, the management software crashed twice during a week of heavy use. Check Point had no explanation for these occurrences.

The VPN-1 was the slowest performer on our tests, coming in last for both 20 and 60 users. For 40 users, the field was very tight, with the VPN-1 coming in at the middle. All the products, however, performed within an acceptable range.

The VPN-1 is a capable, scalable solution with good security features, best suited to environments with Check Point firewalls already in place.—Mike Hurwicz

Glossary of VPN Terms

Certificate authority (CA) A third-party organization such as Entrust or VeriSign that provides validation of identity and authority. The CA issues digital certificates (or digital IDs) to create digital signatures and public/private key pairs.

Data Encryption Standard (DES) A 56-bit private-key algorithm that uses the block cipher method. Block cipher sends encrypted data to break the text into 64-bit blocks before transmitting it.

Digital certificate A user's public key digitally signed by the certificate authority. The software sends the certificate with an encrypted message to verify the sender's identity. The recipient uses the CA's public key, which is widely publicized, to decrypt the sender's public key attached to the message. Then the sender's key is used to decrypt the message.

MD5 authentication Verification of message integrity using Message Digest, Version 5, a hash function used to create digital signatures.

Private key The private half of the two-part key cryptography technique on which digital certificates are based. The user keeps the decrypting key secret.

Public key The public half of the two-part key cryptography system. This is what you give the recipient of your data to decrypt your message.

Public key infrastructure (PKI) A federal policy defining the use of public key encryption. It describes the format of certificates and the functions of CAs in both the public and private sectors.

RC4 and RC5 encryption Algorithms developed by RSA Data Security. RC4 and RC5 use a stream cipher

method to encrypt a steady flow of data.

Secure Hash Algorithm-1 (SHA-1) authentication. A hash function developed by NIST (National Institute of Standards and Technology). Though SHA-1 is slower than MD5, it is considered more secure.

Triple DES A procedure where the DES algorithm is used to encrypt the data three times.

IP Security Protocol (IPSec) An IETF-developed security standard that details data tunneling, authentication, and encryption over an Internet connection.

Tunneling The process of encapsulating one data packet inside another. In a VPN, IPX, AppleTalk, and IP packets are encapsulated inside packets that are sent to portals able to reconstitute them.

A hand holds a yellow Fluke OneTouch 10/100 Network Assistant device. The screen displays a network diagram with components: 2 NetWare Servers, 1 IP Router, 11 Stations, and 1 NetPins Se. The device has a cable connected to the top and a finger pointing at the screen.

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Internet Devices Fort Knox Policy Router

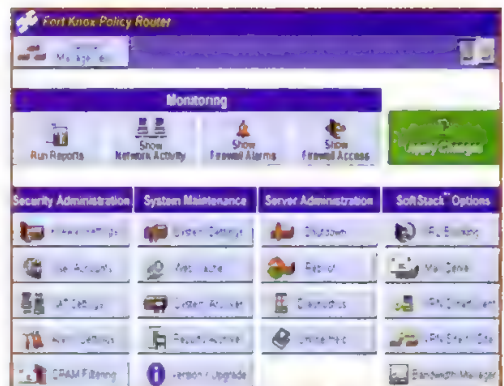
List price: \$4,995; with 100 clients, \$7,990. Internet Devices Inc., Sunnyvale, CA; 888-237-2244, 408-541-1400; www.internetdevices.com, 901 at www.pcmag.com/ infolink.



Coming to the VPN market from a different angle is Internet Devices, which developed the Fort Knox Policy Router family based on previous experience with ISPs. The result is a flexible, feature-rich, hardware-based VPN solution that was by far the simplest to set up and maintain. We tested the F-3000

(\$4,990 list), which targets the small business. For larger groups, there's the 5000 model (\$9,995 list). Each provides a full firewall implementation and—unique among the products we tested—firmware-upgradable features such as DNS and Web caching, optional URL filtering (\$995 list), and bandwidth management (\$4,995 list). The only thing we missed was certificate support, which curbs scalability. The product earned an Editors' Choice.

We had no trouble installing the device ourselves. In fact, we had it running with some firewall rules and a few VPN clients in an hour. A company with a



THE WEB-BASED management station lets you configure features across all Fort Knox devices.

PERFORMANCE TESTS

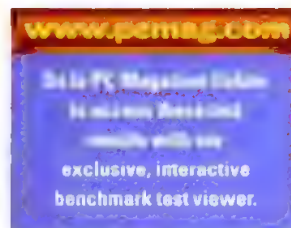
VPNs



Our tests proved these VPN products to be good performers and suitable for remote-access duty, especially if your mobile users can make do with DES encryption. That goes for Microsoft PPTP, too.

We assumed that data encryption and user-authentication schemes would put a substantial drag on performance. Our tests demonstrated that under DES data encryption, degradation was negligible—even under high client loads. The penalty for Triple DES was harsher, and more so at high client loads. The trade-off between MD5 and SHA-1 authentication was less critical; informal testing showing little difference between them.

Our evaluation focused on how well a VPN device would service mobile users dialing in to the server from remote locations rather than using point-to-point connections. Our **Average Throughput per Client** test simulated a typical remote-user environment, with clients transmitting data at 56 Kbps, and it reflects how most VPNs will be deployed today. On our **Power User Throughput** test, clients connected at speeds ranging from 128 Kbps to 1.544 Mbps, reflecting aggregated modem, cable, and ADSL connections—methods that will increase in popularity over time.



The top performers were RedCreek Ravlin 10 and TimeStep Permit Enterprise VPN Solution. Unlike the other two products, these hardware-based devices performed DES and Triple DES in hardware, which gave them a distinct performance advantage.

Some of our testing experiences require explanation. The scores of Shiva LanRover's VPN Gateway are misleading, because the current version of Shiva's client software can't use IPSec to tunnel back to the device. To test it, we used the proprietary *Shiva Smart Tunneling* (SST) method, which gave the device an unfair advantage. SST needs to communicate only with other VPN Gateway units, which lets it conserve header information and skip the authentication that IPSec does in the ESP (Encapsulated Security Payload). Even so, Shiva's product turned in some of the lower scores.

Check Point's high scores are a bit inflated, because of the Sun Ultra Enterprise 2 server platform we used. But this system had more power than needed; our tests showed there was plenty of processing power left over after DES encryption. At press time, the product lacked Triple DES encryption, but it should be available when you read this. Internet Devices Fort Knox Policy Router had the least impressive IPSec scores, particularly at high client counts. At 60-client loads and Triple DES, the Policy Router dropped 49 of the 60 clients. In all fairness, our 60-client load represented the

AVERAGE THROUGHPUT PER CLIENT

High scores are best.

Users	Reference VPN product (installed)	Using DES Encryption and MD5 authentication					Using Triple DES encryption and SHA-1 authentication ¹				
		Check Point VPN-1 Gateway 4.0	Internet Devices Fort Knox Policy Router	RedCreek Ravlin 10	Shiva LanRover VPN Gateway ²	TimeStep Permit Enterprise VPN Solution	Internet Devices Fort Knox Policy Router	Microsoft PPTP ³	RedCreek Ravlin 10	Shiva LanRover VPN Gateway ²	TimeStep Permit Enterprise VPN Solution
20	45.3	34.9	42.8	44.5	44.6	45.6	43.5	36.8	44.9	43.4	42.6
40	40.9	38.5	37.6	39.3	37.9	40.1	37.2	33.4	35.5	36.2	28.2
60	36.1	28.8	33.7	36.2	32.3	37.4	7.4	30.6	27.0	29.1	22.7

(1) The Check Point product is not included here, because it did not support Triple DES encryption. (2) Shiva LanRover uses DES and SST. (3) Microsoft PPTP uses 128-bit RC4 encryption.

Net Tools

VPN

professional IS staff could install the Policy Router and manage all of its functions without a VAR's help—a rare assertion for this product class. Even so, Internet Devices has a professional services organization ready to handle the install, or you can use a VAR. Internet Devices offers software updates and telephone support for 20 percent of the annual cost. For 25 percent, you'll also receive a replacement unit in case of failure.

The management interface was Web-based and easy to use, letting us configure and manage a multitude of features from a single console. Managers will appreciate the extensive logging, exportable to a SQL database. The remote client software was painless to set up, let-

ting users download it themselves from the device. We found this method a mixed bag: Though convenient, there's some risk of would-be attackers using brute force techniques to get a user name and password data. But then again, such an attack would be quickly noticed.

Unlike the client software from RedCreek or Shiva, there's no configuration on the Policy Router's SmartClient. The program will simultaneously send tunneled and nontunneled traffic to the Policy Router, making efficient use of the WAN. Unfortunately, SmartClient will create a tunnel only to the Policy Router from which it downloads the software, limiting

the user's ability to tunnel to different LANs unless they have multiple copies of the client software.

As our tests showed, the Policy Router F-3000 isn't enterprise class; but then it isn't meant to be. It performed well under 20- and 40-client loads; the 60-client load brought it to its knees. Be sure to assess your traffic load and buy the appropriate product.

Generally, the Fort Knox family offers an excellent VPN solution that's best suited to smaller, insular organizations. If you need digital certificates now, you should look for a more scalable solution.—Brad Walden

POWER USER THROUGHPUT

Using DES Encryption and MD5 authentication

(Kilobits per second)

High scores are best.	Reference (no VPN product installed)	Check Point VPN-1 Gateway 4.0	Internet Devices Fort Knox Policy Router	Microsoft PPTP ⁽¹⁾	RedCreek Ravlin 10	Shiva LanRover VPN Gateway ⁽²⁾	TimeStep Permit Enterprise VPN Solution
Average	232	210	195	137	215	163	223
Total	4,648	4,190	3,899	2,748	4,300	3,257	4,454

(1) Microsoft PPTP uses 128-bit RC4 encryption. (2) Shiva LanRover uses DES and SSF.

Under fast connections, the products from TimeStep and RedCreek—and even the software-based Check Point product—managed to break the 200-Kbps barrier, while Microsoft PPTP, Shiva LanRover, and Internet Devices Fort Knox Policy Router turned in much slower scores.

remote user activity of a much larger company than the Policy Router is designed to handle.

As expected, Microsoft PPTP turned in unusual scores. Fundamentally different from IPSec, the PPTP encapsulates a Layer 2 protocol, PPP, in a Layer 3 IP packet. This lets the PPTP rely on the more mature PPP protocol for DNS and the IP address assignment. But every PPTP packet must transport the header of the encapsulated packet. Also, the PPTP relies on PPP to handle encryption. In Microsoft's implementation, 40- or 128-bit RC4 encryption is used. We don't recommend using 40-bit, though; it can be cracked in minutes.

When looking over the numbers, note that our tests don't factor in the latency created by the Internet—which can be significant and unpredictable. To increase reliability, connect all your remote users to a single ISP's backbone. Only a few products here can use certificates, so we didn't emphasize their impact on performance. We tested the TimeStep Permit Enterprise VPN Solution with certificates, though. There was a slight performance hit, which fell well within the standard error of our tests. From our limited testing, we conclude that certificates don't affect performance for mobile users.—Analysis written by Kevin Young

With 20 clients, tested under both DES and Triple DES, the hardware-based products scored close to 20 Kbps, while the software products managed to score only around 35 Kbps. Only when we tested under a 60-client load did the encryption method affect performance significantly, with a drop of over 10 Kbps in some products. Not all products

could finish all of our tests. Check Point has only DES encryption, and Microsoft PPTP uses only 128-bit RC-4 encryption. With the exception of TimeStep's 40-1-Kbps DES performance, all products dropped below the 40-Kbps mark when we used 40 clients; DES scores were only a few points higher than Triple DES scores.

How We Tested

We placed the VPN products on a test-bed of 20, 40, and 60 clients, which consisted of a mix of Pentium/166, Pentium Pro/200, and Pentium II/233 PCs. The clients connected to our Synoptics switches at 100 Mbps, half-duplex with Intel Pro/100B NICs; the switches connected to a 3620 Cisco router at 10 Mbps, half-duplex. The 3620 connected serially to a Cisco 2503 router; we connected its Ethernet port to the test product's WAN Ethernet port and its LAN port to a Cisco 2908 10/100 switch, which served as the protected network.

For the Power User Throughput test, the Synoptics switch connected at 100 Mbps, half duplex to a Cisco 4700 and connected to the WAN port at 10 Mbps, half duplex. We installed Microsoft PPTP on a Compaq 1600R with dual Pentium II/266 processors and 512MB of RAM, loaded with Windows NT Server 4.0 SP3. We installed Check Point VPN-1 Gateway 4.0 on a Sun Ultra-Enterprise II with dual Ultra-Sparc 296-MHz processors having 256MB of RAM.

To control the traffic levels sent by each client, we loaded Ganymede Software's Chariot on the 60 clients and on a Sun Ultra-Enterprise II, running Solaris 2.6 with dual 296-MHz processors and 512MB of RAM. The Windows NT server, running Windows NT 4.0, had dual Pentium Pro 200s and 512MB of RAM.

Our test suite used four TCP protocols: HTTP, SMTP, POP3, and a large file transfer. We tested 25 percent of the clients with each protocol; so for the 40-client load, for example, 10 clients sent HTTP traffic, 10 sent SMTP, and so on. We ran the suite with DES and MD5, then with Triple DES and SHA-1. The Power User Throughput suite (using DES and MD5 authentication) had 20 clients with the same protocols at varying speeds. For each protocol, we connected the clients at speeds of 1.544 Mbps and at 128, 144, 256, and 768 Kbps. We tried to standardize across all products and disabled data compression where possible. We performed encryption and authentication in the ESP Header.

Microsoft PPTP

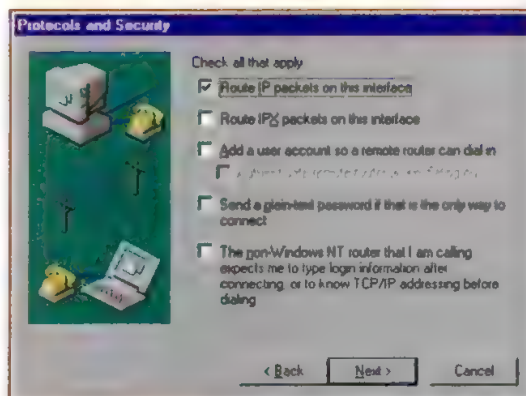
List price: with Windows NT server, \$809; new Windows NT setup with 100 clients, \$4,309. Microsoft Corp.; Redmond, WA; 800-426-9400, 425-882-8080; www.microsoft.com/communications. 902 at www.pcmag.com/infolink.

● In case you need a VPN and aren't convinced that IPsec is the last word on interoperability, Windows NT 4.0 includes built-in VPN functionality using the Point-to-Point Tunneling Protocol (PPTP) and 128-bit (for North American use only) RC-4 encryption. Though not the most sophisticated or secure solution here, the Microsoft PPTP offers both adequate features and safety for businesses not transmitting the most sensitive data. And because it's integrated with the OS, user administration is a snap.

Relative to the other products here, the PPTP was easy to set up and configure, taking us about a day without outside help. If your network needs are straightforward, you can probably do it yourself. But if you need to do something nonstandard or have a very large or sophisticated network, you'll want to enlist a VAR's help.

The PPTP has undergone several iterations since its original release. Currently, it's part of Routing and Remote Access Service (RRAS), free for download. This service com-

bines routing, RAS, and VPN connectivity in a single management console. And although we enjoyed the tight integration, we were a bit disappointed with the administration interface. Logically, its layout makes sense, but navigation felt unnatural, and it took us some days to become accustomed. Moreover, some of the configuration, such as increasing the number



MOST OF MICROSOFT PPTP's configuration is handled through the Routing and RAS Admin.

of tunnels, is done via the Network control panel rather than the RRAS console, as we would have expected.

Recently, Microsoft's implementation of

several patches for both server and client, including Dial-Up Networking 1.3. If you deploy the PPTP, we suggest you apply these enhancements.

Generally, performance wasn't bad. Though the PPTP's scores landed at the bottom of our Throughput tests with a 20-client load, as we scaled up, the PPTP's performance increased while that of other products decreased. With 60 clients and RC-4, this unit beat out the competition, though on our Power User test it came in last.

PPTP's single biggest appeal is its low cost. In fact, we included the product in this roundup to match it against the much more expensive dedicated VPN solutions. For the most part, we were impressed. So if your goal is to replace lease lines or dial-up access, the PPTP deserves serious consideration. But if your plans include moving

to certificates, setting up an extranet, or inter-operating with your partners' VPNs, look instead to scalable, IPsec-compliant, hardware-based solutions with CAs.—Kevin Young

SUMMARY OF FEATURES

VPNs

PC MAGAZINE
EDITORS' CHOICE

	Check Point VPN-1 Gateway 4.0	Internet Devices Fort Knox Policy Router	Microsoft PPTP	RedCreek Ravlin 10	Shiva LanRouter VPN Gateway	TimeStep Permit Enterprise VPN Solution
Base list price	\$3,495	\$4,995	With Windows NT Server, \$809	\$3,500	\$6,200	\$5,495
List price with 100 remote clients	\$8,495	\$7,990	For Windows NT client holders, \$809; for new Win NT setup, \$4,309	\$8,500	\$11,250	\$11,895
List price per remote client (based on 100 clients)	\$85	\$80	For Windows NT client holders, \$8, for new Win NT setup, \$43	\$65	\$113	\$120
ICSA-certified	■	■	■	■	■	■
IPSEC / PPTP / L2TP	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Recommended system requirements (software products)	Pentium II CPU, 64MB RAM, 30MB disk space	N/A*	486 CPU, 16MB RAM, 125MB disk space	N/A*	N/A*	N/A*
Operating systems supported (software products)	Windows NT 4.0, Unix	N/A*	Windows NT Server 4.0	N/A*	N/A*	N/A*
Processor (hardware products)	N/A**	Pentium II	N/A**	Intel i960	Pentium	Intel i1980
Encryption algorithms supported	CAST, DES, FWZ-1, RC4-40, Triple DES	DES, RC4, Triple DES	RC4	DES, Triple DES	DES, Triple DES	Blowfish, CAST, DES, IDEA, RC5, Triple DES
Proprietary tunnel methods	None	None	None	EIP	Shiva Smart Tunneling	None
Number of simultaneous tunnels	Unlimited	50	256	250	800	500
Proprietary certificate support	■	■	■	■	■	■
Third-party X.509v3 support	■	■	■	■	■	■
Interfaces available	ATM, FDDI, frame relay, 10/100 Ethernet	10/100 Ethernet	Any Windows NT-compatible interface	10/100 Ethernet	10/100 Ethernet, Ethernet to dual serial	Ethernet
Client OS availability	Windows 95, NT	Windows 95, 98, NT	Windows 95, 98, NT	Windows 95, NT, Win for Workgroups 3.11	Windows 95, 98, NT	Windows 95, NT, Mac OS
Firewall/IP router capability	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Bandwidth management	■	■	■	■	■	■
CLI / GUI / Web-based management	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■

N/A*—Not applicable: This feature applies to software only. N/A**—Not applicable: This feature applies to hardware only.

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RedCreek Ravlin 10

List price: \$3,500; with 100 clients, \$6,500. RedCreek Communications Inc., Newark, CA; 888-745-3900, 510-745-3900; www.redcreek.com, 903 at www.pcmag.com/infolink.

● RedCreek Communications aims high, targeting its VPN at nationwide ISPs and Fortune 500 companies. But the device doesn't support certificates, a must-have for scalability in that market. And though it's well priced, the Red-

Creek Ravlin 10 (\$3,500 list) is missing some important functionality out of the box. On the plus side, RedCreek, like TimeStep, has incorporated many pieces of the proposed IETF IPSec standard; ICSA certification is forthcoming; and the product's performance was excellent.

The Ravlin 10 is one of two hardware-based VPN solutions we tested that is only a VPN and not a firewall (TimeStep is the other). RedCreek is concentrating on deliver-

ing a strong VPN-only solution and aggressively solicits VARs; an interactive map on the company's Web site shows the VARs in your area. For branch office connections, the Ravlin 4 (\$1,300 list) rounds out the RedCreek family.

For us, setup was relatively straightforward, taking about a day with the vendor's help. Remote client configuration wasn't too difficult, although the initial start-up required us to enter information such as IP addressing

VPNSERVICES

Virtual What? Just Give Me a Secure Connection

What if you want all the benefits of a virtual private network, but not the administrative and management hassles that go along with it? A compelling alternative is to outsource the whole shebang to an ISP. To learn what's available today, we spoke with ISPs—both large and small—including AT&T, Concentric, McHenryCom, PSINet, and Uninet (now WorldCom Advanced Networks). We did all the legwork: Here's all you'll need to know to find the service that best suits your company's needs.

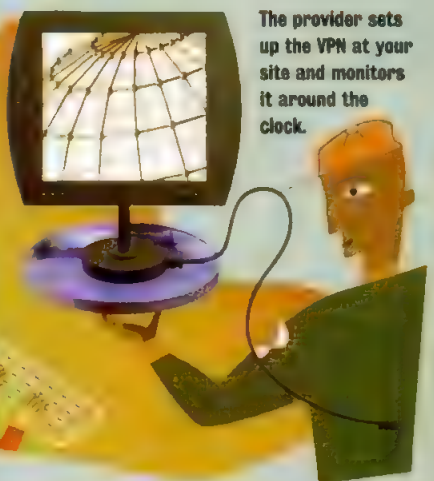
Who: We found that most ISPs offer VPN services. But what surprised us is that the little guys own the biggest piece of the Internet business-services pie. According to Ziff-Davis Market Intelligence (ZDMI), our sister organization, the large ISPs—which include AT&T Corp., BBN Corp. (part of GTE Corp.), MCI Communications (moving to British Telecom), PSINet, and Uninet Corp. (the Internet subsidiary of WorldCom)—own no more than a 3 percent share of commercial accounts, whereas

small ISPs enjoy over 60 percent. So it pays to look in your own backyard; if you're unfamiliar with your local ISPs, consult www.thelist.internet.com for a comprehensive listing.

Where: If you need to use a VPN to connect offices in remote cities or even countries, you'll need an ISP that has POPs (Points of Presence in those locations). Most of the ISPs we talked with offer POPs nationwide, and some, such as WorldCom, have POPs in most major world cities. To provide service in these locations, the ISPs lease connections from other ISPs and telephone companies.

How much: Pricing is difficult to pin down. Because line tariff and service fees change so often, most vendors were reluctant to provide us with basic pricing, but a few did. For example, a T1 VPN connection between two locations using PSINet will cost you \$2,895 a month, plus a \$2,195 one-time connection fee. A 1,021-Kbps managed connection from AT&T is \$2,366 a month, but that doesn't include an optional installation fee.

Reliability: Outsourcing a VPN service ensures that you get a high degree of equipment reliability and security. The VPN service provider should have redundancy in equipment, connections, and people. Redundancy builds reli-



The provider sets up the VPN at your site and monitors it around the clock.

bility, but redundancy is more practical when it's shared. Except for McHenryCom, all of the ISPs we talked with own the VPN equipment they install at your locations and monitor it around the clock. They will also replace equipment within hours if a unit fails. Though the folks at McHenryCom require you to buy the equipment—a Shiva LanRover VPN Gateway—they do monitor it 24 hours a day. And though most ISPs have redundant equipment and own it themselves, be sure to ask whether they do.

Security: The VPN provider will have experienced employees, procedures, software, and equipment to deal swiftly with outside attacks. ISPs with hundreds of clients can invest in the expensive firewalls and can afford the staff to set up and maintain them. McHenryCom and WorldCom also provide complete firewall systems that they install and maintain on your premise along with the VPN devices.—Steve Rigney



Find a provider with POPs in the cities you need to connect to.

Net Tools

VPN

schemes and multiple encryption settings. A capable IS professional could set up the Ravlin 10 with the help of the manuals, but RedCreek recommends enlisting its technical support or relying on a VAR.

The Ravlin 10's base management features are limited, but they made the device fairly easy to use. Unlike the other products here, the Ravlin 10 provides a front control panel that lets you configure basic parameters such as IP addresses and masks, which the unit requires.

But missing is the ability to manage individual users' access. To gain this control, the only option is to link the device to a RADIUS server (\$1,000 list).

To monitor the unit fully, you'll need the RavlinNode Manager (\$1,000 list), a program that runs on Microsoft Windows NT, 95, or 98. Its interface resembles Explorer's tree-like hierarchical structure, and we found it some-

what difficult to use. Configuration was fairly straightforward, though some of the menu choices could use better descriptions. Logging

and statistical information was complete, and we liked the detailed event messaging and useful MIB II component to monitor SNMP traffic.

An excellent performer, the Ravlin 10 demonstrated good throughput under the

Hand-holding: All of the ISPs we talked with provide on-site consulting services to help you determine the VPN services you need based on your applications and network. All of these extras are free, with the hope you will purchase the vendor's services. Some of the smaller ISPs, such as McHenryCom (www.mc.net), go the extra mile and will help you train your administrators as well as design and troubleshoot your network. But at some point, the folks at McHenryCom will start to bill you for the consulting.

Value-added service: Reporting services are built into most ISPs' contracts. The amount and depth of the reporting ranges from basic connection utilization to reporting connections by user and by protocol. ISPs such as McHenryCom even provide an inventory of the hardware and software

on your client PCs. The reports are provided as a weekly e-mail, or you can ask for more detailed or frequent reports. Because the routers and other VPN equipment are located on your premises, you can also attach a terminal to the device and monitor traffic on your own. The ISP adds value by providing easy-to-read charts that decipher the information scrolling across the terminal screen.

Many ISPs offer additional services. For example, WorldCom Advanced Networks, which has many business partners (FreeGate, TEAM Internet, and 3Com, just to name a few), offers networking equipment of all kinds, consulting and installation services, and connection options including customized DSL and fiber-optic cable. These companies want to help create and host your Web sites, filter your URLs, and help with network backups.

They're also ready and willing to grow your VPN service for you.

Still unsure? It all comes down to knowledge, cost, and fear. Do you have a competent staff that can maintain and monitor the VPN around the clock? If not, are you willing to hire someone dedicated to its upkeep? Are you concerned that you might set it up incorrectly, or that your data will be hacked? Clearly, the argument for outsourcing is strongest if you don't have the employee and equipment infrastructure in place to support a VPN. But even if you have a management team that can handle outsourcing the task, the VPN will let that team focus on its primary business—local servers and access, backup, client help, trouble tickets, and so on—without being distracted by corporate Internet and network access issues.

What if It Breaks?

A service-level agreement (SLA) is a contract that sets goals for performance and penalties for failure to meet them. The SLA forces the ISP to share accountability for the reliability of the service. Though SLAs typically come with lots of bluster and fine print, a typical agreement from PSINet will credit a customer with a one-day service fee for every hour or portion of an hour of disrupted service. You can get credits if the provider misses a delivery date or doesn't promptly report an outage. Though a day's credit might be a tiny percentage of your loss if you rely on the VPN for business transactions, you can also negotiate a more reliable connection that includes alternate routes for your data, create on-call backup circuits, or even specify stiffer penalties for the ISP.

Larger ISPs, such as WorldCom Advanced Networks, don't have set SLAs and claim that they will negotiate a settlement when and if a problem occurs with the VPN connection. But we strongly recommend choosing an ISP that has a detailed SLA in place.

Of the ISPs we investigated, Concentric (www.concentric.net)

offered the best SLA options, for both dial-up and dedicated connections. The dedicated-connection SLA covers both latency and availability. For example, Concentric

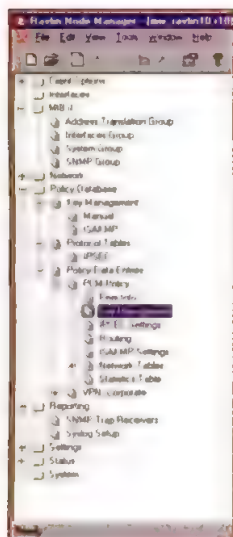
offers a 125-ms response time for a packet; for every millisecond over 125, Concentric will knock 1 percent off your monthly bill. Concentric even guarantees the connection speed of your modem when you connect to one of its POPs. AT&T (<http://att.net>) offers an SLA with 99.7 percent availability—but only for its dedicated connections. AT&T also targets a 150-ms latency for its connections, but there is no SLA to provide a refund if this isn't met. McHenryCom provides one of the most straightforward SLAs: If your connection is down 0 to 2 hours, you get one free day for the month; 2 to 6 hours of downtime results in a free week. The refunds

continue to increase with further downtime. Unfortunately, though all of the ISPs told us they guarantee the amount of bandwidth you pay for, none of them offered details on a specific bandwidth SLA. Because these terms are negotiable, they should be discussed up front with the provider.



Net Tools

VPNs



FOR CONFIGURATION, the RavlinNode Manager employs an Explorer-like interface.

Shiva Corp., Bedford, MA; 800-847-4482; www.shiva.com. 904 at www.pcmag.com/infoclink.

● We think Shiva has a winner with the Shiva LanRover VPN Gateway (\$6,200 list), a hardware-based VPN developed with technology from its recent acquisition of Isolation Systems. Acquiring rather than building a VPN

60-client load with both DES and Triple DES encryption.

Though the device lacks some important management features and needs certificate support to meet the needs of its intended market, the Ravlin 10's performance proves that RedCreek is on the right track.—
Martin Wong

Shiva LanRover VPN Gateway

List price: \$6,200; with 100 clients, \$11,250.

product has allowed Shiva to enter the VPN market quickly with a full-featured offering that bundles a proprietary certificate authority (\$2,400 list). But the VPN Gateway isn't for everyone. It's one of the highest-priced solutions we tested, and weak IPSec compliance makes the unit best suited to businesses that don't need an extranet or an e-commerce solution.

The VPN Gateway is a hardware device that runs a proprietary OS, an approach we feel increases both reliability and security. The bundled firewall and CA are based on Isolation System's technology. For more speed, a hardware accelerator card (\$2,950 list) is also available.

In addition to the user name/password authentication that comes with the system, the VPN Gateway supports a variety of authentication schemes, such as third-party tokens, Novell Directory Services (NDS) and Bindery, RADIUS, and Windows NT Domains. But in Version 6.5 which we tested, Shiva's bundled CA didn't work with IPSec. (Version 6.6, due out this November, should work.)

The VPN Gateway was quite complex to set up; we recommend enlisting a VAR's help. Remote client configuration required us to set a number of tunnel definition parameters as

well as key and certificate information. A plus is that you can put this information on a configuration disk and install it on each machine or

across the network. User management was straightforward; most changes made at the server were downloaded automatically to the client (unlike with Check Point's manager). Logging and reporting were both complete, and the bundle included an extremely useful monitoring and troubleshooting tool.

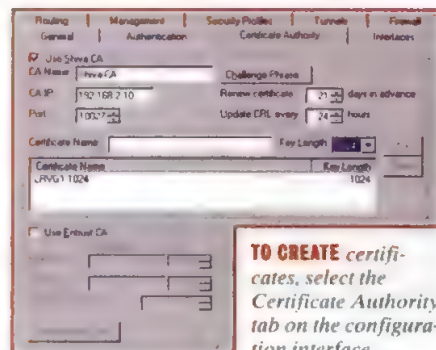
We found the management interface to be plain but easy to navigate and use, with most functions no more than a couple of levels down. Nevertheless, the interface was designed with an expert in mind; we recommend working with a VAR until you become familiar. On rare occasions, you may have to use the command line interface.

The VPN Gateway can be configured for automatic failover from one device to another. Should a client detect a failed tunnel, it will consult a list of tunnels (configured at the client) for an alternate able to reach the destination and make the change transparently to the user. Shiva doesn't expect failover groups to include more than three or four VPN Gateways, though more are possible.

The vendor's solution will be of particular interest to users who already have Shiva components in place. The VPN Gateway works with Shiva's RAS server, and the LanRover Access Switch. Moreover, if you add to your unit Shiva's new Access Manager software (starting at \$1,500 list), it will let you centrally manage all three products from a single console.

Generally, the VPN Gateway was a competitive performer, at its best with smaller numbers of users and Triple DES, where it trailed the leaders (TimeStep for DES and RedCreek for Triple DES) by only 2 or 3 percent. Under a 40- or 60-user load and DES, however, the device trailed the competition.

The VPN Gateway is a robust solution, best suited to Shiva shops or smaller organizations,



TO CREATE certificates, select the Certificate Authority tab on the configuration interface.

DIGITAL CERTIFICATES

Let's See Some ID!

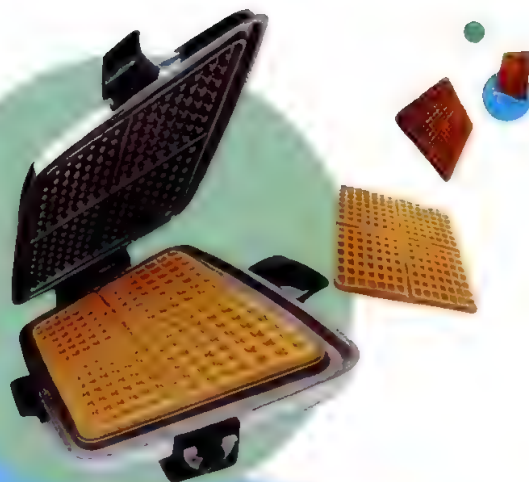
Though password-based technologies work well within known, fixed populations, management becomes unwieldy and authentication uncertain when the population sprawls across many companies and organizations as well as private individuals. The solution is to issue a single form of electronic ID to each user—like a driver's license or passport—by an independent organization that everyone trusts, a certificate authority (CA).

The technology behind this concept is called public key infrastructure (PKI), a system of public and private encryption keys. And the end product is a digital certificate or digital ID. Digital certificates can be attached to a user by name and identity, or by e-mail address, and ensure that confidential messages and attachments are protected from tampering and impersonation. Digital IDs are also available for intranet or Internet

servers to prove authentication of the site.

Using PKI, any computer can encrypt information so that only the intended recipient can decrypt it. Before sending a message, the user encrypts it using a public key; when the recipient obtains the message, he decrypts it using his private key, thereby ensuring the authenticity of both parties' identities. The holders of both the public and the private keys can encrypt and decrypt information.

Major CA companies such as Entrust, Netscape, and VeriSign have a lot of responsibility. Though the CA must take care to identify the individual and securely transmit the certificate—often by courier or through personal contact—being able to revoke a certificate is equally important. If your organization is suddenly faced with a disgruntled employee, you'll need to revoke that user's key quickly before damage is done.—SR



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as well as those that don't plan to tunnel to outside partners.—MH

TimeStep Permit Enterprise VPN Solution

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● While interoperability among VPNs remains on the horizon, TimeStep, with its hardware-based VPN Solution (\$5,495 list), provides the strongest IPSec implementation in this roundup. Several years ago, TimeStep bet heavily on IPSec, and now it's poised to reap the benefits. (Not only is TimeStep ICSA-certified, but the ICSA uses TimeStep's toolkit to

Net Tools

VPNs

perform interoperability testing.) Further enhancing TimeStep's interoperability is the largest offering of encryption algorithms in this

roundup, as well as the strongest certificate scheme here—the result of a deal forged with Entrust to bundle its certificate authority (\$6,000 list). Though performance was excellent, the product has a few weaknesses. Main-

Suitability to Task



	Check Point VPN-1 Gateway 4.0	Internet Devices Fort Knox Policy Router	Microsoft PPTP	RedCreek Ravlin 10	Shiva LanRover VPN Gateway	TimeStep Permit Enterprise VPN Solution
Manageability	Good	Excellent	Good	Fair	Good	Fair
Security and access control	Good	Good	Fair	Fair	Good	Fair
Tunnel management	Good	Good	Good	Fair	Good	Good
IPSec flexibility	Good	Fair	N/A	Good	Good	Excellent

N/A—Not applicable. Microsoft PPTP doesn't support the IPSec protocol.

Virtual private networks are sophisticated products with multifaceted purposes. But to be worthy, each must excel in a few core capabilities. For the **manageability** task, we evaluate the intuitiveness of the administrative console, and how easily we can add, remove, and handle users.

For **security and access control**, we appraise the device's physical security as well as how the administrator can control user access beyond the tunnel. Here, we find

standalone hardware devices with integrated firewalls to be the most desirable. We are concerned with products that distribute their client software over the Web or have Web-based management.

We evaluate how easily the administrator can access tunnel status and bring tunnels up and down for the **tunnel management** task. On the client side, end users should find it easy to begin and end sessions and to switch among tun-

nel endpoints. We judge the client software in terms of flexibility yet require it to be futz-proof to the novice.

Finally, **IPSec flexibility** is an important criterion to help evaluate the product's scalability. We base this rating on how well each conforms to the current incarnation of the IPSec proposed standard. ICSA-certified products have the advantage here, as well as those that support X.509v3 certificates.

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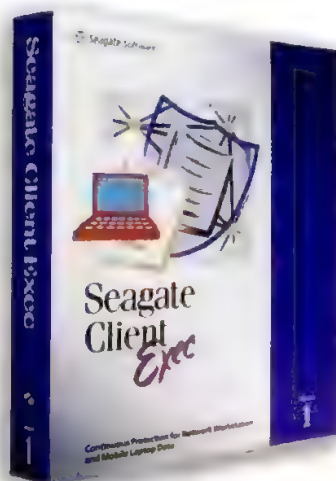
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ly, it lacks a firewall, has a clunky administrator's interface, and offers minimal reporting on the gateway.

Setup was an involved process, to put it mildly. We took more than four days to get the VPN, Entrust CA, and client software working. We accomplished this, however, without the vendor's help, thanks primarily to the excellent documentation provided by Entrust for installing the certificate authority. Unfortunately,

the TimeStep documentation made assumptions about our familiarity with the technology and did not always go step by step. On occasion, it would direct us to "Configure the client software," for example, yet explain no further and move on to the next phase. TimeStep suggests that you enlist its technical support or a VAR's help, and we agree.

Net Tools

VPN

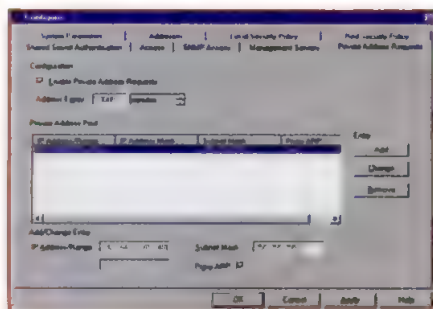
You can set up certificate users either through the certificate authority or enter them directly into the device. Adding noncertificate users

requires you to enter the user's IP address and a password, which is used as the shared secret. But if your shared-secret remote users don't have static IP addresses, you must let them connect from any IP address on the Internet, making the VPN somewhat less secure.

The Permit/Config program lets you manage all the devices within your organization. Though the Entrust interface was excellent, we found Permit/Config tricky. Though it was easy to navigate, we weren't always sure that the program had incorporated all of our changes.

TimeStep's remote client was fairly straightforward yet not as easy to use as that of Internet Devices. We found it more flexible, so if your remote users are savvy, they will be able to utilize some of Permit/Client's features, such as the ability to change tunnels from one device to another.

A fine feature is the ability for users to establish a tunnel back to the corporate office



THOUGH PERMIT GATE'S Permit/Config was easy to navigate, we sometimes found it hard to determine whether our changes had been made.

and simultaneously browse the Internet without encryption. And the ability to force all traffic through the tunnel is unique, useful for an administrator who wants to monitor an employee's Internet usage on company time, for example.

Most of the VPNs we tested had good reporting, but the Permit 5 fell short: It was limited to text logs we had to sort through manually. On the other hand, the logging capabilities on the client were excellent and served as a useful troubleshooting tool.

Though not the perfect VPN solution, the Permit 5 wide range of encryption algorithms and strong certificate story make it the best bet for large organizations seeking to set up extranet partnerships or having other plans that demand robust IPSec interoperability.

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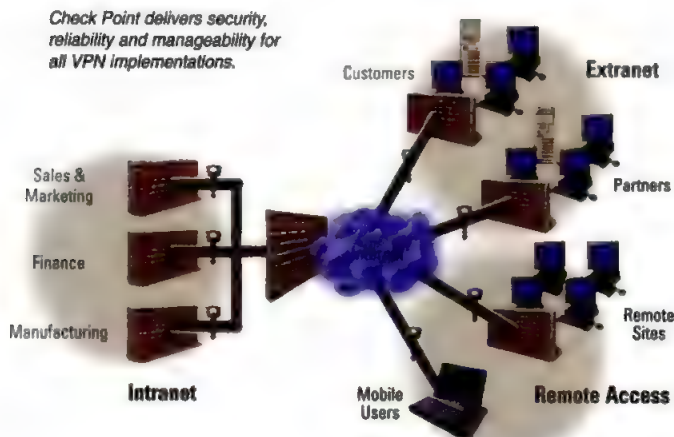


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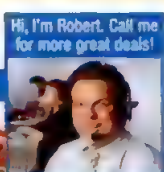
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Net Tools

FROM THE BENCH

NETWORK MANAGEMENT

Tivoli for the Rest of Us

By Arie Moller

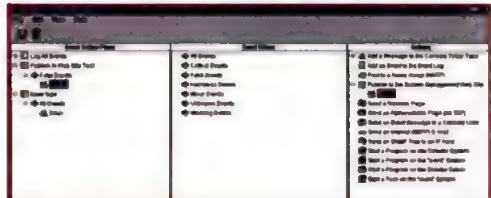
Network management tools such as HP OpenView and Tivoli Enterprise have always been the province of large enterprise organizations. Though such products offer features not seen in

IT Director Server runs on Windows NT 4.0 and builds its management database with the included Microsoft Jet or a preexisting SQL server. The Console runs on Windows 95 or 98 and is used to configure the software. The Agent software runs on all Windows 3.11, 95/98, NT, OS/2, and NetWare clients. The program can manage clients over IPX/SPX, NetBIOS, or TCP/IP networks, but the

Console must connect to Server over IP.

The Console interface is split into three horizontal panes: system groups, group members, and available actions. Though the default groups are based on OS, you can choose from a selection of predefined groups or make your own. We assigned tasks by simply dragging an action icon onto individual computers or groups.

Most of the tasks ran without incident, but we found a few glitches. When creating a package to distribute Microsoft Office 97, we couldn't point to the shared area on the server where the files were located. We had to map a path to the share, assign it a drive letter, and then point to the drive letter. Also, IT Director placed our Windows 98 clients in the Windows 95 default group. Tivoli said both problems should be remedied by press time. **IT Director 1.1.** List price: Server, 20-node license, \$8,995; Tivoli Systems Inc., Austin, TX; 800-284-8654; www.tivoli.com. 906 at pcmag.com/infolink.



DRAG-AND-DROP MANAGEMENT: IT Director's intuitive interface makes management tasks easy.

lower-end products, they're also expensive and complex to set up. But Tivoli brings high-end features down to the small business with IT Director 1.1 (\$8,995 list for a server and 20 nodes). Though it's pricey for the market, we found the package well integrated and easy to use.

IT Director delivers all the capabilities of high-end packages: SNMP device management, hardware and software inventory, file transfer and distribution, and process management for services. Our favorite features were the unique Intranet Management site and the scrolling real-time monitor. To use the Intranet Management, you need a Web server but no HTML programming knowledge. The Site Builder Wizard automatically creates the pages. You can post monitored events on the Management Site and distribute software from a central location. The monitor lets you drag and drop items onto a real-time ticker that scrolls along the bottom of the console display.

The product includes three components; each was a snap to install.

SERVERS

Powerhouse Processors

By Steve Buehler

We tested the first server with Intel's powerful new Xeon processor—the Dell PowerEdge 6300—for our First Looks section ("Xeon: The New High-End," August 1998). With the release of Xeon servers from Compaq and Micron, you now have a choice of products built on Intel's main server platform. With 100-MHz buses and Slot 2 architecture for full-speed access to 1MB of L2 cache, these servers show their mettle in processor and computation-intensive applications such as data mining and analysis.

The expected release in early 1999 of 450-MHz versions of the Xeon chip with 2MB cache will raise the bar another notch. Although they're not cheap—at \$11,000 to \$45,000—these servers easily outperform the Pentium Pros they replace. With up to twice the throughput of previous architectures, the 0.25-micron Xeon-based servers are such a significant advance that Intel plans to end production of the .35-micron Pentium Pro chips by year's end.

Vendors are beginning to exploit other advances in the Xeon architecture, such as 64-bit PCI slots. The Compaq and Dell machines have 64-bit PCI, but the Micron doesn't. Though 64-bit PCI is possible, the NICs, RAID controllers, and other devices that take advantage of Xeon were not ready by press time.

The first of these products—the Mylex eX-tremeRAID controller—should be shipping by press time, but you'll have to wait longer for the major vendors to release them. These devices will be seen as a requirement for handling the prodigious

capability of multiprocessor output without slowing the overall throughput. Future enhancements expected for Xeon-based servers include eight-way SMP support based on Corollary's ProFusion architecture, which Intel acquired earlier this year. Look for these eight-way-and-up monsters to appear in the first half of next year.

Compaq ProLiant 6000

If you imagine your dream fully loaded Pentium enterprise server, the Compaq ProLiant 6000 (\$45,220 street) could be it. Compaq's four-way Xeon server demonstrated top-of-the-line performance and packs plenty of room for growth.

The ProLiant 6000 can be configured as a standalone, wheeled tower or mounted on a rack. Although one drive cage is standard, the unit's large chassis allows for up to three cages. Each cage holds six 1-inch drives, four 1.6-inch drives, or a combination of the two, in 4GB, 9GB, or 18GB capacities. That equals a maximum of



POWER-PACKED: The Compaq ProLiant 6000 puts out incredible performance in a top-line model.

218GB of hot-pluggable storage—twice that of the Dell model and four times that of the Micron. Useful indicator lights show activity, power, and error for each drive, and four additional external 5.25-inch drive bays are available.

CROSS

TALK



Considering how fast these servers are, everything's been a little slow in their rollout. It's interesting that many people see these as Unix killers—specifically as "Sun block." I would imagine that the Linux community will jump on the power they provide. Still, I think Xeon has a long way to evolve.

Our test unit had nine 1.6-inch 9GB Seagate 10,000-rpm drives, using all three cages. New to the ProLiant family, the 3Wide-Ultra SCSI-3 Smart Array 3100 ES in our unit had 56MB of cache and three internal channels to support the three drive cages. Unlike the Micron AceleRAID 250 solution, the 3100 ES doesn't support Ultra-2-Wide (U2W) or Low-Voltage Differential SCSI (LVDS), which

Right, Toni. And buyers must think how to use them. Software development budgets are tied up in Y2K patch-and-mend. Few resources are left to build new databases and computational programs that make these engines chug. These servers are meant to crunch data, not just deliver files.



provide faster transfer rates and allow longer external cables. We also received a triple-channel Wide-Ultra SCSI-3 controller.

Not having a screwdriver was no problem; thumb screws hold access panels in place, and plastic clips hold down expansion cards. Other interior components were held with easily noticed orange thumb screws.

Compaq left out the hot-plug

Net Tools

FROM THE BENCH

PCI slots found in the Dell unit; it plans to include them in the upcoming ProLiant 7000. The ProLiant 6000 includes five 64-bit PCI slots, four 32-bit PCI slots, and a single ISA slot. Two memory cards house up to 8GB worth of ECC EDO DIMMs—twice the storage of the Dell or Micron models. One toolless, hot-swap power supply is standard, but it can hold three power supplies for a 2+1 redundant load-sharing setup.

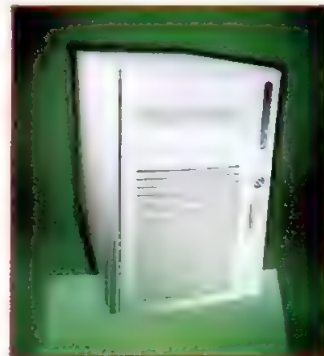
We especially liked Compaq's SmartStart. This unique management utility determines which drivers and utilities within Windows NT need updating and then updates them at your request. Compaq Insight Manager handles SNMP server management, monitoring the health of hardware components, and Integrated Remote Console is included for out-of-band management. Compaq

includes a three-year warranty, free on-site service during the warranty, and toll-free, lifetime, round-the-clock technical support.—Stephen Chan

Compaq ProLiant 6000. Street price: Tested configuration, \$45,220. Compaq Computer Corp., Houston; 800-345-1518; www.compaq.com.

Micron NetFrame 6200

Aimed at the department rather than the enterprise, the Micron



WELL SERVED: The NetFrame 6200 aims at the department.

Fifteen users, one Internet



With the Intel® InBusiness™ Internet Station, you can share a single Internet connection among multiple users, easily and inexpensively. With one modem, one ISP account and one phone line, now you can have multiple users in your small business surfing the Web at once. It's easy to set up, easy to use, and makes distributing Internet access a snap. Plus, with no maintenance required and easy upgrades, there's no reason to even think of paying for individual accounts.

NetFrame 6200 (\$28,475 list) lacks some of the marquee features found in other high-end Xeon systems. Without the 64-bit PCI and hot-plug expansion slots, the NetFrame 6200 is a high-performance

server with a lower price tag.

At just 7U, the NetFrame 6200's dimensions equal those of the Dell PowerEdge; five or six servers fit on a rack. The NetFrame 6200's diminutive size

limits the server to a single six-drive, hot-swap cage. The NetFrame 6200 supports 1-inch 4GB or 9GB drives but not the 18GB drives found in the Dell and Compaq models. Individual

drive indicator lights are located on the front panel, and three 5.25-inch bays are available.

Our test unit came with six 10,000-rpm Cheetah SCSI drives connected to an optional Mylex

BENCHMARK TESTS

Four-way 400-MHz Xeon Servers



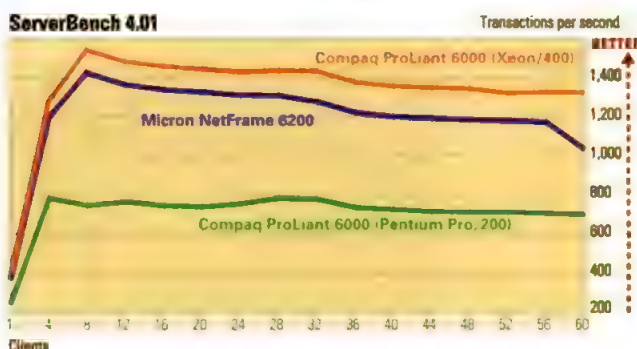
To test the Xeon servers' capabilities, we used ServerBench 4.01 and WebBench 2.0. For comparison, we tested a similarly configured Compaq ProLiant—a 6000 four-way Pentium

Pro 200 with 512K of L2 cache.

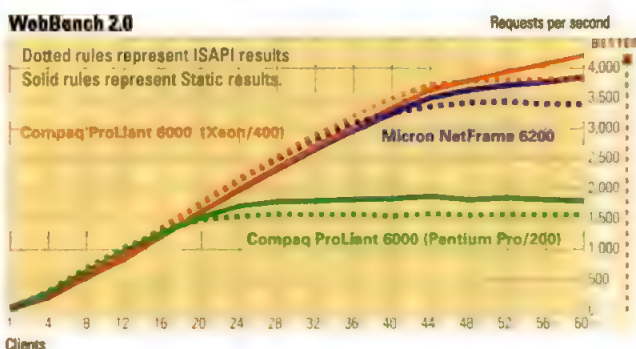
On both test programs, the Compaq Xeon unit outperformed the Micron. This could be the result of the Compaq's greater RAID cache and striping over eight hard

disks, but the 1GB of RAM on each system should have masked those differences. Compaq's use of thirty-two 32MB DIMMs over two memory cards (as opposed to Micron's 128MB DIMMs) was a factor.

ServerBench 4.01



WebBench 2.0



connection, no catch.



Easy to install, easy to use.

The Intel InBusiness Internet Station, part of Intel's growing line of small business solutions, gives your company multiple Internet connections from a single account. No catch. To learn more and enter to win your own Intel InBusiness Internet Station, visit our Web site. ► www.intel.com/network/business

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Simply the BEST



BYTE BEST

The QMS *magicolor* 2.
The Best Color Laser Printer.

*All prices in US dollars.

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Editors' Choice Award — The QMS *magicolor* 2 CX

"Color laser printers have now become affordable enough that some small offices can deploy one as their only shared printer. None exemplify this more than our Editors' Choice in this category, the QMS *magicolor* 2 CX."

— PC Magazine, May 1998

Best Overall — The QMS *magicolor* 2 CX

"QMS's relatively low-cost *magicolor* 2 CX makes a clean sweep in all categories, including best-overall, best-quality, and best-value color laser printer."

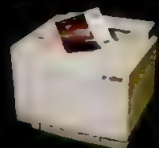
— BYTE Magazine, April 1998

The Best Business Printer — The QMS *magicolor* 2 CX

"The QMS *magicolor* 2 CX speeds along at 4 pages per minute in full color—16 ppm in black and white—providing unprecedented performance in an under \$4,000 color laser printer."

— Macworld Magazine,
January 1998

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AceleRAID 250 with 8MB of cache. The two integrated SCSI channels are U2W/LVDS-compliant. Unique is the combination of the AceleRAID 250 and the on-board Symbois Logic SCSI chip set, giving the server RAID capabilities. The AceleRAID 250 card adds a third RAID channel and includes an on-board, single-channel Symbois Logic 53C810AE narrow SCSI-2 interface.

The NetFrame 6200 lacks tool-less access. Even with a screwdriver, it took some muscle to get the access cover off. Large pieces of gray foam further impede this process, but Micron claims they improve airflow and keep the large processors in place. We found the server enclosure small

but easy to work with.

Micron plans to include hot-plug and 64-bit PCI slots in its upcoming enterprise server. The NetFrame 6200 has seven 32-bit PCI slots (six dedicated, one shared PCI/ISA). Because Micron used the 450NX Basic chip set, the server's single memory card is limited to 4GB of ECC EDO DIMMs. Ours had three hot-swappable, load-balancing power supplies, but you'll need a screwdriver to replace them.

On the management side, Intel LANdesk Server Manager 6.0 comes standard with Micron's custom snap-in for SNMP management. The NetFrame 6200 also has an Emergency Management Port integrated into COM2 for basic manage-

Net Tools

FROM THE BENCH

ment. The unit has a five-year warranty on processors and main memory, a three-year policy for parts replacement by the

next business day, and one-year of next-business-day on-site service.—SC

Micron NetFrame 6200. List price: \$28,475; without OS support, \$24,379. Micron Electronics Inc., Nampa, Idaho; 888-634-8799, 208-898-3434; www.micronpc.com. 907 at pcmag.com/infolink.

NETWORKING KITS

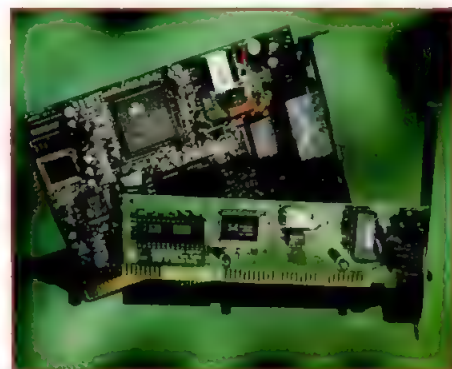
One-Card Network

By Les Freed

By combining existing technologies in a new and clever way, NovaWeb Technologies' NovaWeb 2001 (\$299 list) lets you create a small- or home-office Ethernet LAN complete with Internet connectivity. At its core is a proprietary ISA server NIC that includes both an on-board V.90 modem and a four-port Ethernet

hub. The package also includes a second ISA Ethernet card to connect a second PC, 50 feet of black Ethernet cable, and a customized version of Osis's WinProxy for sharing the modem connection.

On our Ascend Max test server, the NovaWeb's 56K modem pro-



GET CONNECTED: The NovaWeb 2001 is a quick way to connect a small LAN to the Internet.

A typical plug-and-play installation had us surfing the Web in less than half an hour. The NovaWeb server NIC installs as both a standard modem and an Ethernet adapter. You can put three more PCs on your LAN, but because the PC with the proprietary NIC acts as a host, it must be on for the network to operate.

NovaWeb's installer program automatically loads and configures all the necessary Windows networking components and WinProxy. The program also configures all Web browsers on both machines to use WinProxy. The NovaWeb WinProxy license provides only two simultaneous Internet connections, but an upgrade to connect additional PCs is available (\$50 list).

The NovaWeb 2001 uses stan-

vided connections between 40 Kbps and 52 Kbps on most calls. File and print sharing worked as expected. In case you already have a 56K modem, a modemless version is also available (\$199 list).

Although you could build your own NovaWeb-like solution for the same money, NovaWeb 2001 offers distinct advantages. It provides a one-shot, unified installation, uses a single ISA card slot, reduces cable clutter, and because it takes its power from the host PC, eliminates an external power supply.

NovaWeb 2001. List price: \$299. NovaWeb Technologies, Fremont, CA; 888-722-6932, 510-249-9500; www.novawebtech.com. 908 at pcmag.com/infolink. **PC**

SUMMARY OF FEATURES

Xeon Servers

■ YES ■ NO

	Compaq ProLiant 6000	Micron NetFrame 6200
Price of tested configuration	\$45,220 street	\$24,379 list
Processor	Pentium II Xeon/400	Pentium II Xeon/400
Number	4	4
Viewable screen size (diagonal, in inches)	15	N/A
L2 cache	1MB	1MB
Maximum installable RAM/type	8GB / ECC EDO	4GB / ECC EDO
Chip set	450 NX Full	450 NX Basic
Motherboard manufacturer	Compaq	Intel
CD-ROM drive	24X IDE	32X SCSI
Disk Subsystem		
Hard disk (capacity)	Seagate Cheetah ST19101WC (9GB)	Seagate Cheetah ST39102LC (9GB)
RAID controllers	Compaq SmartArray 3100ES	Mylex AceleRAID 250
RAID levels supported by disk array controller	0, 1, 4, 5	0, 3, 5, 6
RAID controller channels	3	3
RAID controller cache	64MB (56MB for caching)	8MB
Expandability		
Type of memory slots/Number in use/Total	DIMM / 32 / 32	DIMM / 8 / 16
Expansion-bus slots	5 64-bit PCI, 4 32-bit PCI, 1 ISA	6 32-bit PCI, 1 32-bit PCI/ISA
Front-accessible drive bays (inches)	4 (5 25)	2 (5 25)
Security and Fault Tolerance		
Hot-swappable drive bays	3 cages holding 6 1" or 4 1.6" drives each	1 cage holding 6 1" drives
Lockable hard disk subsystem/power button	■ ■	■ ■
Lockable reset button	N/A	■
Server Management		
Management software	Compaq Insight Manager 4.1	LANdesk Server Manager 6.0
Remote alert via SNMP/pager/modem	■ ■ ■	■ ■ ■
Remote reboot	■	■
Service and Support		
24-hour, 7-day live technical support	Life of server	Life of server
Warranty	3 years	3 years, 5 years on CPU and RAM

N/A—Not applicable. The product does not have this feature.

Things you won't need to install a Symphony cordless home network.



First, came the cordless phone. Now, Proxim introduces the cordless computer network for the home.

Now you can get all the benefits of high speed home networking without the hassles of installing a wired network or the high cost of having someone else do it for you.

Plug into the Proxim Symphony™ cordless home network. It uses secure radio technology — not cables — to network your computer at a fast 1.6 Mbps data rate.

Symphony networking means you can share printers, files and modems just like a regular Ethernet network. Even better, Symphony lets you share your Internet connection simultaneously among all the

computers in your home — with only one ISP account, one phone line and one modem.

With Symphony, you're in charge: put your computers and peripherals where you want, not where your phone jacks dictate. Symphony will cover virtually any home and its immediate surroundings. If you're a laptop user, you can even surf the Web or send email from your couch, kitchen table, bedroom or patio!

So save your tools for more important projects. Check out the Proxim Symphony cordless home networking solution — and where you can buy it — at www.proxim.com/symphony4. Or, call us at 1-888-549-3758 for full details.

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NETobjects

What's the one thing your business can't live without? An effective Web site. So get **NetObjects Fusion**—the world's most award-winning site-building software that gives you the power and functionality you need to build a real e-site.

Open site environment. Gives you total choice and flexibility to use any content editor, connect to any database or application server, publish on any Web server (no server-side extensions required), and display pages in any browser—with exceptional ease.

Dynamic Database Publishing.

Components included with NetObjects Fusion ProPack let you effortlessly publish up-to-the-minute data. Currently included are components for Lotus Domino, Allaire Cold Fusion, Microsoft Active Server, and Netscape LiveWire servers.

E-commerce components help you easily add powerful functionality to your site—such as online catalogs, merchant connections, and "shopping cart" features. NetObjects is working with a host of partners to deliver best-of-breed e-commerce solutions.

Best-of-both-worlds HTML. Work the way you want. NetObjects Fusion generates design-centric pages with pixel-perfect precision, and text-based HTML with ultra-lean code. Or, use any HTML editor to write your own code.

DHTML Actions help you sustain your customers' interest by letting you create sophisticated, message-based animation and interactive effects. Use powerful menu options or download our free DHTML Actions Development Kit to add your own custom JavaScripts to menus.

Everywhere HTML means you build your site once using NetObjects Fusion, then publish it anywhere, on any browser. Optimized to deploy on both Netscape Navigator and Microsoft Internet Explorer 4.x browsers, or choose any 2.x, 3.x, or 4.x browser.

Download a trial copy of **NetObjects Fusion 3.0** today.

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When it comes to evaluating NetObjects Fusion, the industry experts have spoken:



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e-business tools

TAKE YOUR QUEUE

5

*Easy steps to make you a
network printing star*



a **F**ive-step program guaranteed

to improve your network printing

Step 1: Taking stock.

Do your end-users complain about how tough it is to get access to the network? Do you wish you had more staff and resources to help them? Help is out there, but it may be different than you think. First, ask yourself these questions:

- Do you have an increasing number of remote users?
- Is it tougher for you to legislate their buying patterns, particularly for the "small stuff" like printers?
- Do you find yourself dictating printer resources to your users, rather than having the printing resource match the need?
- As a result, does it take more staff time than you'd like to connect peripherals to the network?

If you answered yes to any of these questions, there's a better way. A way that allows you to give users whatever printing resources they need. When they need them. Without your losing control of the situation.

Step 2: Out with the old.

You would probably employ a PC or file server as the solution to the problem in Step 1. While this approach is powerful for sharing data, it doesn't hold up well for sharing peripherals.

PCs and file servers weren't designed for the task of attaching peripherals such as printers to the network. They are general-purpose machines that don't scale well. They are too expensive to administer for the task at hand. They're vulnerable as a single point-of-failure and have to be taken offline to add or remove functionality. You do the work to ensure they're compatible with multiple printers from multiple vendors.

No wonder vast numbers of end-users complain about not being able to print their documents on the network printers they prefer. It's time to look at a better solution.

Step 3: In with the new.

Axis' proven, market-leading print servers give your printers the intelligence to act as independent servers on your network. This frees your PCs or file servers for more important tasks and allows you to place your printers where you want them.



Based on Axis' ThinServer™ Technology, Axis print servers support 28 protocols, 13 operating systems, and the "who's who" of printers. Which means you don't have to think about which users you can connect to what printers. And they'll get there fast.

Installation takes 15 minutes, and print jobs will fly through the queue with throughput of up to 500 Kbps.

Printer companies such as Xerox, Canon, Epson and Ricoh understand the power of ThinServer Technology, which is why they've formed partnerships with Axis to enhance the networkability of their products.

The industry's most elegant solution, ThinServer Technology is built into all Axis products including print servers, network attached storage and Web cameras. It combines major operating system protocols, Web-based management and scalable RISC hardware in a miniature, self-contained design.

Step 4: Give yourself a raise.

Your organization can achieve significant cost savings using Axis print servers. Let's say you need to add 10 more printers to your Chicago office. A conventional approach would require approximately five PCs or file servers to provide network connectivity (figuring one PC for every two peripherals).

Out with the old: \$2,000 per server or PC X 5 = \$10,000.
In with the new: \$200 per print server or PC X 5 = \$1,000.



You should save more if you include costs for PC or file server installation, downtime and licensing at a rate of approximately two hours per server.

With Axis print servers, installation time is cut from hours to minutes — roughly 15 for each Axis ThinServer device added. And you'll see these savings in hard dollars and man-hours — every time you expand or change network configuration, regardless of the size or site of your operation.

One Axis customer, The Chinnet Company, estimates that for every AXIS 570 print server installed, the company has spared itself system costs of up to \$1,000 as well as up to \$400 in cabling and \$1,400 in printer costs. Subtracting the price of the AXIS 570, Chinnet's total savings for every AXIS 570 installed is as high as \$1,900.

Step 5: Turn it on.

Axis print servers deliver the speed, ease of use, and upgradeability you need to get the most out of today's high-quality printers — and tomorrow's.

Axis print servers support major network platforms, including NetWare, Windows, UNIX, Apple EtherTalk, OS/2, LANtastic, LAN Manager/Server and IBM SNA. They are easy to use, thanks to Axis' NetPilot™ management software, and can be managed from any standard Web browser.

Axis print servers combine high performance and great flexibility with ease of use, so they contribute to lower network costs by saving administrative time and effort and by extending the life of your products.



http://ads.zdnet.com/micro/axis/print_servers/

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AXIS Servers Power Research Company

Each year, Gale Research publishes hundreds of reference books and CDs as well as Internet and online products serving the needs of libraries, students, consumers and business people. The firm gives high priority to ensuring that its own information technology resources are both up-to-date and highly accessible.

According to Jim Kenyon, director of technical infrastructure at Gale, "It just didn't make sense for us to invest in color printers if we couldn't make them easily accessible" to Gale's mix of PCs running Windows, Macintosh systems and UNIX machines.



With responsibility for Gale's voice and data networks,

Kenyon's team needed a fast, easy way to make newly-purchased Canon BubbleJet printers accessible to everyone on the network. The solution: Axis Communications' PrintPoint 140 BJC print servers.

"One of the greatest things about the Axis solution is that it worked right out of the box," says Kenyon, whose previous experience integrating print servers taught him that getting print servers installed and working could take as long as three days. But because Axis print servers come preconfigured with step-by-step documentation, installation took no more than five minutes.

"They were true plug-and-play," Kenyon reports.

“BETTER”

- end user

“FASTER”

- it manager

“CHEAPER”

- chief financial officer

“GUARANTEED”

- axis communications

It's no wonder Axis is an industry leader in network printing.

Axis has a print server that's made for you. With 28 protocols, 13 operating systems and throughput of 500 Kbps, Axis print servers have your printers on the network in minutes. Whether multi-port or single-port, Ethernet or Token Ring, Axis print servers are your high-performance solution for workgroup LANs to corporate enterprise networks. Axis' 32-bit RISC processor is custom-designed to get your data on and off the network fast! And Axis' management capabilities allow you to effortlessly perform software upgrades over the network from a central location.

Share your printers like never before. Learn more about Axis print servers and how they can simplify your business. **Visit our website today** to take advantage of special promotions.

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Canon's BJC Bubblejet Printer
with the AxiS Print Server
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PC Tech

INSIDE

POWER PROGRAMMING:

ToolTips show users what the buttons on toolbars do in Microsoft Visual C/MFC applications. But they needn't be limited to toolbars: We show you how to implement ToolTips in dialogs and property pages. *Page 245.*



UTILITIES:

Web portals are a good way to find information of interest to you on the Web quickly. But though many commercial portals are customizable, they still have a "one size fits all" look and feel. Page1 makes it easy for you to create your own personalized Web start page. You can add links just by dragging and dropping, and you can customize the page's appearance just as easily. *Page 255.*

PC SOLUTIONS: A better way to get the date in a Windows NT 4 batch file; preventing ScanDisk from running automatically; redialing in Windows NT Dial-Up Networking; quieting a noisy CD-ROM drive; moving e-mail folders between systems; entering a calculated date in Microsoft Word; removing linked formulas in Excel 97; changing the date format in Access 97; and more. *Page 259.*



Handling Data with SQL

Learn the basics of SQL's four main data manipulation statements: INSERT, SELECT, UPDATE, and DELETE.

By Gabrielle Gagnon

Fluency in SQL is a valuable asset to anyone who uses a database. In this article, the second half of a two-part primer on SQL, we walk you through four fundamental data manipulation statements—the heart of SQL's functionality—introducing you to comparison operators, selection predicates, and three-valued logic along the way. When you've completed this primer, you will be on your way to becoming a SQL master.

In our previous issue, we concluded by creating a table using the CREATE TABLE statement (See Figure 1), an example of a category of SQL statements called data definition language (DDL) statements. DDL statements define database objects such as tables, columns, and views. They don't deal with rows in a table, however, because DDL

statements don't handle the actual data that goes into a database. There is another category of SQL statements for doing that: data manipulation language (DML) statements.

There are four basic DML operations in SQL: INSERT, SELECT, UPDATE, and DELETE. Since these are the statements that most SQL users will work with, we'll cover all of them here. In Figure 1, we show a table called EMPLOYEES. Each row corresponds to a specific employee record. Take some time to familiarize yourself with this table; we'll be using it for the rest of our examples.

THE INSERT STATEMENT

The INSERT statement allows you to insert rows into a named table. For example, to insert John Smith's employee record into the example table, enter the following SQL statement:

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```
INSERT INTO EMPLOYEES
VALUES ( 'Smith', 'John', '1980-06-
10', 'Los Angeles', 16, 45000) ;
```

In this form of the INSERT statement, the system will attempt to enter the values into corresponding columns. The columns are in the order in which they were defined in the CREATE TABLE statement. In our example, the first value, 'Smith', goes into the first column, LAST_NAME; the second value, 'John', goes into the second column, FIRST_NAME; and so on.

We said the system will *attempt* to enter values; it does type checking as well as rule enforcement. If you violate a rule—by trying to enter a character string into a numeric column, for example—the system will reject the entry and return an error message.

If SQL rejects one of the column values you've entered, none of the other column values in the statement will be entered either. That's because SQL supports *transactions*. A transaction takes the database from one consistent state to another. If part of a transaction fails, then all of it fails; the system is restored, or *rolled back*, to the state it was in prior to the failed transaction.

Going back to our INSERT example, notice that all of the integer and decimal values were entered without quotation marks or formatting, while the character and date values were enclosed in single quotation marks. Inserting commas into numerals for readability will result in an error. (Remember that in SQL, commas are item separators.)

Table 1	LAST_NAME	FIRST_NAME	HIRE_DATE	BRANCH_OFFICE	GRADE	SALARY
	Smith	John	06/10/1980	Los Angeles	16	45000.00
	Bunyan	Paul	07/04/1970	Boston	12	70000.00
	Adams	John	01/21/1992	Boston	20	100000.00
	Smith	Pocahontas	04/06/1976	Los Angeles	12	100000.00
	Smith	Bessie	05/02/1940	Chicago	5	200000.00
	Jones	Davy	10/10/1970	Boston	8	45000.00
	Jones	Indiana	02/01/1992	Chicago		

FIGURE 1: This SQL table was created with the CREATE TABLE statement. Each row corresponds to an employee record.

Also note that it's important to use single quotes when entering literal values. Double quotes are used to enclose delimited identifiers.

For date entry, we used the standard SQL date format—yyyy-mm-dd—but systems can be customized to accept other formats. Of course, with the year 2000 right around the corner, you'll want to use four digits for the year.

Now that you understand how the INSERT statement works, let's populate the rest of the EMPLOYEES table:

```
INSERT INTO EMPLOYEES
VALUES ( 'Bunyan', 'Paul', '1970-
```

```
07-04', 'Boston', 12, 70000) ;
INSERT INTO EMPLOYEES
VALUES ( 'John', 'Adams', '1992-01-
21', 'Boston', 20, 100000) ;
INSERT INTO EMPLOYEES
VALUES ( 'Smith', 'Pocahontas',
'1976-04-06', 'Los Angeles', 12,
100000) ;
INSERT INTO EMPLOYEES
VALUES ( 'Smith', 'Bessie', '1940-
05-02', 'Chicago', 5, 200000) ;
INSERT INTO EMPLOYEES
VALUES ( 'Jones', 'Davy', '1970-10-
10', 'Boston', 8, 45000) ;
INSERT INTO EMPLOYEES
VALUES ( 'Jones', 'Indiana', '1992-
02-01', 'Chicago', NULL, NULL) ;
```

In the last entry, we did not know the values for Mr. Jones's grade level or salary, so we entered NULL (without quotes). NULLs are a special case in SQL that we shall discuss in more detail later. For right now, however, we'll just say that a NULL indicates that the value is missing.

Sometimes, as in the case we just mentioned, you may wish to enter values for some of the columns and not all of them. Rather than entering NULL for the columns you want to omit, you can use another form of the INSERT statement, given below:

```
INSERT INTO EMPLOYEES ( FIRST_NAME,
LAST_NAME, HIRE_DATE,
BRANCH_OFFICE)
```

```
VALUES ( 'Indiana', 'Jones', '1992-
02-01', 'Indianapolis') ;
```

In this form, we've placed a list of column names after the table name. (Default values are automatically entered into the columns omitted from the list. If no defaults are defined, NULLs are entered.) Notice that we've changed the column ordering and that the value order corresponds to the new column order. If this statement had omitted FIRST_NAME or LAST_NAME (which are constrained to be NOT NULL), the SQL command would have failed.

To recap, let's look at the syntax diagram for the two forms of the INSERT statement you've just learned:

```
INSERT INTO table [ ( column {, column
} ) ]
VALUES ( column1value [ { ,
columnXvalue } ] ) ;
```

As in Part 1, we used square brackets ([]) to denote optional elements and curly braces ({ }) to denote an element that can be repeated any number of times. (You wouldn't include these special characters in the actual SQL statement.) The regular parentheses are required in the VALUES clause and the optional column list.

THE SELECT STATEMENT

The SELECT statement extracts specified columns and rows from one or more tables. Since querying and retrieving data is one of the most important functions in database management, the SELECT statement is the SQL workhorse. In fact, people who access databases solely to analyze data or generate reports may never have to learn another SQL statement.

The result of a SELECT statement is always another table. During execution, the system selects columns and rows matching your criteria from the database and places the results into a temporary table. In the case of direct SQL, it displays the results on the terminal screen or sends them to a printer or file. It can also place the results into a named table in conjunction with other SQL statements.

The SELECT statement is quite powerful. Although its name implies that it performs only one of the relational algebra operations we mentioned in Part 1, *select* (also known as *restrict*), it actually implements two other relational operations as well: *project* and *join*. We will discuss SELECT and PROJECT operations below. (JOINS are more advanced and beyond the scope of this article.) The SELECT statement can also perform aggregate calculations and sort data for reports.

The minimum syntax of a SELECT statement is as follows:

```
SELECT columns FROM tables;
```

When you execute a SELECT statement in this form, the system returns a result table made up of the selected columns and all of the rows from the table(s) you specified. This is the form that implements the relational PROJECT operation.

Let's look at some examples using the EMPLOYEES table shown in Figure 1. (This is the

table we will use for all of our SELECT statements. The actual results of our queries are given in Figures 2 and 3. We will be referring to these result tables in the rest of our examples.)

Suppose you wanted to see a list of branch offices where employees work. Here's how you would write the query in SQL:

```
SELECT BRANCH_OFFICE
FROM EMPLOYEES;
```

Executing the above SELECT statement will give you the result shown in Figure 2, Table 2.

Since we specified only one column in the SELECT statement, our result table has just one column. Notice that there are duplicate rows in the result table. This is because several employees work at the same branches. (Remember that SQL returns the values from *all* of the selected rows.) To eliminate duplicates in the result set, you can add the DISTINCT clause to your SELECT statement:

```
SELECT DISTINCT
BRANCH_OFFICE FROM
EMPLOYEES ;
```

This query yields the results shown in Table 3.

Now you've eliminated the duplicates, but the result isn't in any particular order. What if you wanted to see the branches listed alphabetically? Use the ORDER BY clause to sort results in ascending or descending order:

```
SELECT DISTINCT
BRANCH_OFFICE
FROM EMPLOYEES
ORDER BY BRANCH_OFFICE ASC ;
```

The result of this query is shown in Table 4. Notice how we placed the column name BRANCH_OFFICE after ORDER BY. That's the column we want to sort on. Why did we have to repeat the column name when it's the only column in the result table? Because we can sort the results on any column in the table even though we're not displaying it. The keyword ASC after BRANCH_OFFICE stands for *ascending order*. If you wanted to sort the column in descending order, you would have used DESC instead.

Also, we should point out that the ORDER BY clause sorts only the results in the temporary table; it doesn't affect the original table.

Suppose you wanted to see a list of employees sorted by branch office, from the highest-paid employees down to the lowest-paid. Within each salary bracket, you also wanted to see the employees listed by date of hire, starting with the most recent hires. Here's the statement you'd use:

```
SELECT BRANCH_OFFICE, FIRST_NAME,
      LAST_NAME, SALARY, HIRE_DATE
FROM EMPLOYEES
ORDER BY SALARY DESC,
```

```
SELECT BRANCH_OFFICE FROM EMPLOYEES
```

Table 2	BRANCH_OFFICE
	Los Angeles
	Boston
	Boston
	Los Angeles
	Chicago
	Boston
	Chicago

```
SELECT DISTINCT BRANCH_OFFICE FROM EMPLOYEES
```

Table 3	BRANCH_OFFICE
	Los Angeles
	Boston
	Chicago

```
SELECT DISTINCT BRANCH_OFFICE FROM EMPLOYEES
ORDER BY BRANCH_OFFICE ASC
```

Table 4	BRANCH_OFFICE
	Boston
	Chicago
	Los Angeles

FIGURE 2: Tables 2 through 4 show the results of our single-column SELECT examples.

```
HIRE_DATE DESC ;
```

Here we're selecting and sorting multiple columns. The sorting priority is determined by the order in which you place the columns. SQL will first sort the results by the first column in the list. If it finds any duplicates in the first column, it will sort them by the second column; if it finds any duplicates in the second, it will sort them by the third; and so on. The result of this query is shown in Table 5.

Typing out all of the column names in a long table can be tedious, so SQL lets you use an asterisk (*) whenever you want to select all the columns in a table:

```
SELECT * FROM EMPLOYEES ;
```

This query returns the entire EMPLOYEES table, as shown in Table 1.

To recap what we've covered so far, let's update the SELECT statement syntax we gave you at the beginning of this section:

```
SELECT [DISTINCT] (column [ {, column}
] ) | *
FROM table [ {, table} ]
[ORDER BY column [ASC] | DESC [ {,
column [ASC] | DESC } ] ] ;
```

(The vertical bar designates an alternative, allowing one choice.)

DEFINING SELECTION CRITERIA

In the SELECT statements we've shown so far, we've limited the number of columns in the result table but returned all of the rows. Let's look at how to qualify the SELECT statement so it returns only the rows you want to see:

```
SELECT columns FROM tables
[WHERE predicates] ;
```

The WHERE clause sets conditions that rows must meet in order to be included in the result table. These conditions are specified in one or more *predicates*. (A predicate states a possible truth about something.) If the predicate for any given row is true, that row is included in the result table; otherwise it is left out. In SQL statements, predicates are usually expressed through comparisons. For example, if you wanted to see all of the employees whose last name was Jones, you would use the following SELECT statement:

```
SELECT * FROM EMPLOYEES
WHERE LAST_NAME = 'Jones' ;
```

The LAST_NAME = 'Jones' part is the predicate. When executing this statement, SQL compares the value of each row's LAST_NAME to 'Jones'. If an employee's last name is Jones, the predicate is true, and that employee's information will be included in the result table. (See Table 6.)

THE BIG SIX COMPARISONS

The predicate in our previous example contains a comparison based on equality (LAST_NAME = 'Jones'), but SQL predicates can contain several other types of comparisons as well. The most common ones are

Equal to	=
Not equal to	<>
Less than	<
Greater than	>
Less than or equal to	<=
Greater than or equal to	>=

An example of a comparison not based on equality is given below:

```
SELECT * FROM EMPLOYEES
WHERE SALARY > 50000 ;
```

This query will return only employees whose annual salary is greater than \$50,000.00. (See Table 7.)

LOGICAL CONNECTORS

Sometimes you need to qualify a SELECT statement with more than one predicate. For example, if you just wanted to see information about Davy Jones, the result in Table 6 would not be correct. To qualify a WHERE clause further, you can use the logical connectors AND, OR, and NOT. To retrieve only Davy Jones's employee record, you could enter the following:

```
SELECT * FROM EMPLOYEES
```

```
SELECT BRANCH_OFFICE, FIRST_NAME, LAST_NAME, SALARY, HIRE_DATE
FROM EMPLOYEES ORDER BY
SALARY DESC,
HIRE_DATE DESC
```

Table 5	BRANCH_OFFICE	FIRST_NAME	LAST_NAME	SALARY	HIRE_DATE
	Chicago	Bessie	Smith	200000.00	05/02/1940
	Boston	John	Adams	100000.00	01/21/1992
	Los Angeles	Pocahontas	Smith	100000.00	04/06/1976
	Boston	Paul	Bunyan	70000.00	07/04/1970
	Los Angeles	John	Smith	45000.00	06/10/1980
	Boston	Davy	Jones	45000.00	10/10/1970
	Chicago	Indiana	Jones		02/01/1992

```
SELECT * FROM EMPLOYEES WHERE LAST_NAME = 'Jones'
```

Table 6	LAST_NAME	FIRST_NAME	HIRE_DATE	BRANCH_OFFICE	GRADE	SALARY
	Jones	Davy	10/10/1970	Boston	8	45000.00
	Jones	Indiana	02/01/1992	Chicago		

```
SELECT * FROM EMPLOYEES WHERE SALARY > 50000
```

Table 7	LAST_NAME	FIRST_NAME	HIRE_DATE	BRANCH_OFFICE	GRADE	SALARY
	Bunyan	Paul	07/04/1970	Boston	12	70000.00
	Adams	John	01/21/1992	Boston	20	100000.00
	Smith	Pocahontas	04/06/1976	Los Angeles	12	100000.00
	Smith	Bessie	05/02/1940	Chicago	5	200000.00

FIGURE 3: Tables 5 through 7 show the results returned in our examples of the multicolumn SELECT statement.

```
WHERE LAST_NAME = 'Jones' AND
FIRST_NAME = 'Davy' ;
```

In this case, two predicates are joined by the logical connector AND. For the entire expression to be true, both predicates must be true. If you want to qualify a SELECT statement so that either one or the other value is acceptable, use the OR connector:

```
SELECT * FROM EMPLOYEES
WHERE LAST_NAME = 'Jones'
OR LAST_NAME = 'Smith' ;
```

Sometimes the best way to formulate a predicate is to state it negatively. If you were interested in seeing the employee information for all but the Boston office, you could write the following query:

```
SELECT * FROM EMPLOYEES
WHERE NOT (BRANCH_OFFICE = 'Boston') ;
```

The keyword NOT is followed by a comparison enclosed in parentheses. This negates the result. If an employee's branch office were in Boston, the enclosed predicate would return a value of true, but the NOT operator would

reverse the value to false and the row would not be selected.

Predicates may be nested within other predicates. To ensure that they are evaluated in the correct order, use parentheses to group them:

```
SELECT * FROM EMPLOYEES
WHERE (LAST_NAME = 'Jones'
AND FIRST_NAME = 'Indiana')
OR (LAST_NAME = 'Smith'
AND FIRST_NAME = 'Bessie') ;
```

SQL follows the standard mathematical convention for evaluating expressions: The expression within parentheses is evaluated first; other expressions are evaluated from left to right.

That wraps up logical connectors. But before we go on, let's update our SELECT statement syntax:

```
SELECT [DISTINCT] (column [ {
column} ] ) | *
FROM table [ {, table} ]
[ORDER BY column [ASC] | DESC [
{, column [ASC] | DESC} ] ]
WHERE predicate [ { logical-
connector predicate } ] ;
```

NULLS AND THREE-VALUED LOGIC

NULLs are a complex subject in SQL, and a detailed discourse on them is better suited to an advanced course in SQL than to a primer. But since they need special handling and you will probably encounter them, we'll talk about them briefly here.

First of all, when NULLs are tested in predicates, they require special syntax. If, for example, you wanted to view all the information on employees for which you were missing salary data, you could enter the following SELECT statement:

```
SELECT * FROM EMPLOYEES WHERE SALARY
IS NULL;
```

Conversely, if you wanted to see all the information for every employee except those missing salary data, you could enter the following:

```
SELECT * FROM EMPLOYEES WHERE SALARY
IS NOT NULL;
```

Notice that we used the keywords IS NULL or IS NOT NULL after the column name instead of the standard comparison forms: COLUMN = NULL or COLUMN <> NULL (or the logical operator NOT (NULL)).

That's pretty straightforward. It's when you're not explicitly testing for NULLs (and they're there) that things can get confusing.

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WITH ZIFF DAVIS

EES table in Figure 1, you see that Indiana Jones is missing values for GRADE and SALARY. Both of these columns contain NULLs. So you would think that if you ran a query like

```
SELECT * FROM EMPLOYEES
WHERE GRADE <= SALARY;
```

Indiana Jones would appear in the result table. Since NULLs should be equivalent, you'd expect them to pass the test of GRADE being less than or equal to SALARY. (It's a nonsensical query, but never mind that. SQL will let you do the comparison, since both columns are numbers.) However, Indiana Jones won't appear in the results of this query. Why?

As we mentioned earlier, a NULL represents a missing value (not, as one might think, a value of NULL). To SQL that means the value is unknown, and if a value is unknown, you can't compare it with any other value—even with another NULL. So SQL allows a third type of truth value in addition to *true* or *false*, namely the *unknown* value.

If either side of a comparison is NULL, the whole predicate is considered unknown. If an unknown predicate is negated or combined with another predicate using AND or OR, the result is unknown. Since result tables only comprise rows in which predicates return a value of true, NULLs would never pass the test. Hence the need for the special operators IS NULL and IS NOT NULL.

THE UPDATE STATEMENT

The UPDATE statement lets you modify existing rows in a named table.

If, for example, we just found out that Indiana Jones had a grade level of 16 and a salary of \$40,000.00, we could update the database (and eliminate those troublesome NULLs) with the following SQL statement:

```
UPDATE EMPLOYEES
SET GRADE = 16, SALARY = 40000
WHERE FIRST_NAME = 'Indiana' AND
LAST_NAME = 'Jones';
```

The above example illustrates a single-row update, but the UPDATE statement can operate on multiple rows. All rows that meet the conditions of the WHERE clause are updated. If, say, you wanted to move all the employees from the Boston office to a new office in New York, you could enter the following:

```
UPDATE EMPLOYEES
SET BRANCH_OFFICE = 'New York'
WHERE BRANCH_OFFICE = 'Boston';
```

If you omitted the WHERE clause, all of the

rows in the table would be updated with the branch office value of 'New York'.

The syntax diagram for the UPDATE statement as shown is as follows:

```
UPDATE table
SET column = value [ {, column = value
} ]
[ WHERE predicate [ { logical-
connector predicate } ] ];
```

THE DELETE STATEMENT

The DELETE statement is used to delete rows from a named table. As in the UPDATE statement, all rows that meet the conditions in the WHERE clause are deleted. (Since there is no UNDO statement or "Are you sure?" warning in SQL, use caution before executing this statement.) If the powers that be decided to eliminate the Los Angeles office and lay off all the workers, the following SQL statement could do the dirty work:

```
DELETE
FROM EMPLOYEES
WHERE BRANCH_OFFICE = 'Los Angeles';
```

As with the UPDATE statement, omitting the WHERE clause would affect all of the rows in the table.

The syntax diagram for the DELETE statement as shown is as follows:

```
DELETE
FROM table
[ WHERE predicate [ { logical-
connector predicate } ] ];
```

That wraps up our section on the primary data manipulation language (DML) statements. We haven't covered everything SQL can do—not by a long shot. SQL offers many more facilities, like the ability to determine averages, sums, and other calculations from table data and the ability to perform queries involving data from more than one table (multitable queries, also called *joins*). The language also lets you control users' data-access permissions, with the GRANT and REVOKE commands.

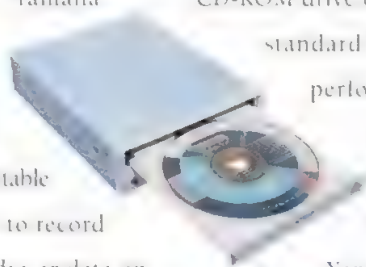
For those who want to learn more about SQL, there are several excellent books on the market. The definitive work on the SQL-92 standard is *A Guide to the SQL Standard*, by C. J. Date with Hugh Darwen (Addison-Wesley). For a less formal presentation, see *Understanding the New SQL: A Complete Guide*, by Jim Melton and Alan R. Simon (Morgan Kaufman). **PC**

Gabrielle Gagnon is a freelance programmer and technical writer.

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ToolTips can help users learn your application. Here's how to implement them in dialogs and property pages.

By Paul Knaplund

ToolTips provide a handy way of displaying short messages about the buttons on the toolbar in Microsoft Visual C/MFC applications. The user doesn't even have to know how to use ToolTips: They just appear automatically when the cursor pauses over a button. ToolTips are great as far as they go, but wouldn't it be nice to provide ToolTips in other areas of your application besides the toolbar?

In this article we will explore how to implement ToolTips in dialog boxes and property pages. Along the way we will take a look at the default implementation of ToolTips in MFC, provide a step-by-step example of using them in a dialog box, and finally derive new Tooltip-enabled classes for a more elegant programming solution.

MFC TOOLTIPS

ToolTips for the buttons on the toolbar are easy in MFC, mainly because most of the work is already done for you. To see how ToolTips work, take a moment to create a Tooltip project. In Developer Studio, click on *File | New*. Click on the *Projects* tab and select *MFC AppWizard (exe)*. Type *Tooltip* as the project name and click *OK*. Select *Single Document* and click *Next*. Accept the defaults for the rest of the steps, then click *Finish* to create your Tooltip project.

Now that you've created the Tooltip project, click on the *Resource* tab of the project workspace. Double-click on the toolbar resource *IDR_MAINFRAME* to display the toolbar, and double-click on the left-most toolbar button. The *Toolbar Button Properties* dialog box for *ID_FILE_NEW* is displayed. Notice that the *Prompt* field contains "Create a new document\nNew." The *Prompt* field contains the status bar text, a \n separator, and the Tooltip text. To change the Tooltip text, you change the text following the \n in the *Prompt* field.

In addition to creating the resources needed for ToolTips, AppWizard is kind enough to enable them when constructing the frame window. This happens during *CMainFrame::OnCreate* in the call *m_wndToolBar.SetBarStyle*. The *CBSR_TOOLTIPS* style parameter passed to *SetBarStyle* does the trick. Behind the scene *SetBarStyle()* calls

EnableToolTips(TRUE) to turn ToolTips on.

There is one other piece to the puzzle. The MFC framework generates a request for a Tooltip when it determines (using a timer control, among other things) that a Tooltip should be displayed. This is where the mouse pause comes in. If you quickly run the mouse over the buttons, nothing happens. When you pause, a *TTN_NEEDTEXT* notification is sent requesting the Tooltip text for display. MFC handles this in *CFrameWnd::OnToolTipText()*, pulling the Tooltip text out of the string table.

In summary, ToolTips require three basic elements:

- providing the string resources containing the Tooltip text;
- enabling ToolTips for a window;
- handling requests for Tooltip text.

DIALOG BOX IMPLEMENTATION

With these three elements in mind, let's implement ToolTips for a simple dialog box. We'll use the *IDD_ABOUTBOX* dialog box that

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AppWizard created for us in the Tooltip project.

Use the resource editor to edit the *IDD_ABOUT* dialog box. Change the text of one of the static-text controls to *Telephone* and delete the other one. Add an edit box with *IDC_ABOUT_TELEPHONE* as the ID. When you're done, the dialog box should look something like Figure 1.

Now edit the string table. Double-click on the string table resource and press the *Ins* key. For the ID type *IDC_ABOUT_TELEPHONE* and for the caption, type *Enter ###-###-###*. Exit the string-properties dialog box. We've just added

the Tooltip text to be displayed for the *Telephone* edit box.

Next, press *Ctrl-W* to start ClassWizard. Select *CAboutDlg* as the class name and object ID. Scroll down the list of messages and highlight *WM_INITDIALOG*. Click on *Add Function* and then click on *Edit Code*. Press the *Del* key to get rid of the comment, and type *EnableToolTips(TRUE)*; press *Enter*.

We've completed steps one and two. Now compile your application to make sure you haven't made any typing mistakes. Next we need to handle the *TTN_NEEDTEXT* notification. Unfortunately ClassWizard doesn't have *TTN_NEEDTEXT* among its messages, so we'll have to add it by hand.

To do this, double-click on *CAboutDlg* in the *Class View* tab of the project workspace. This opens the *CAboutDlg* class header. Scroll down and place a blank line before *DECLARE_MESSAGE_MAP()*. In the blank line type:

```
BOOL OnToolTipText(UINT, NMHDR*
pNMHDR, LRESULT*);
```

The whole message declaration should read:

```
//{{AFX_MSG(CAboutDlg)
virtual BOOL OnInitDialog();
//}}AFX_MSG
BOOL OnToolTipText(UINT, NMHDR*
pNMHDR, LRESULT*);
DECLARE_MESSAGE_MAP()
```

Scroll down a little more in the implementation of *CAboutDlg* and place a blank line before *END_MESSAGE_MAP()*. In the blank line type:

```
ON_NOTIFY_EX(TTN_NEEDTEXT, 0,
OnToolTipText);
```

The whole message map should read:

```
BEGIN_MESSAGE_MAP(CAboutDlg,
CDialog)
//{{AFX_MSG_MAP(CAboutDlg)
//}}AFX_MSG_MAP
ON_NOTIFY_EX(TTN_NEEDTEXT, 0,
OnToolTipText);
END_MESSAGE_MAP()
```

The last step is to create the *OnToolTipText* member function of *CAboutDlg*. Here's what we need:

```
BOOL CAboutDlg::OnToolTipText(UINT,
NMHDR* pNMHDR, LRESULT*)
{
    TOOLTIPTEXT* pTTT = (TOOLTIPTEXT*)
```



```
pNMHDR;
    if(!(pTTT->uFlags & TTF_IDISHWND))
// the ID must be a Handle to a Window
        return FALSE;
    UINT uID = pNMHDR->idFrom;
    uID = ::GetDlgCtrlID((HWND) uID);
    CString strTipText;
    if(!strTipText.LoadString(uID))
// Load String resource
        return FALSE;
    strncpy(pTTT->lpszText,
strTipText, 80); // Stuff text into
// Tool tip, 80 chars max
    return TRUE;    // message was
// handled
}
```

Let's take a closer look at this code.

Line 1 of the `OnToolTipText` function casts the `pNMHDR` parameter to what it really is, a pointer to a `TOOLTIPTTEXT` structure. The `TOOLTIPTTEXT` structure contains two items of interest: `uFlags` indicates whether we have a handle to a window, and `lpszText` holds the ToolTip text to be displayed.

Line 2 looks inside the `TOOLTIPTTEXT` structure to check `uFlags` to make sure we have a handle to a window. If not, we exit with `FALSE` to deny the ToolTip. This is a safety vestige from the original `CFrameWnd::OnToolTipText()` function, which had to deal with a wide range of resources, such as menus, buttons, and menu separators.

Lines 4 and 5 pull the `HWND` out of the `NMHDR` structure and turn it into the dialog control ID, which we used in the string table to hold the ToolTip text. Line 7 loads the text into a `CString` object, and line 9 copies the first 80 characters of the ToolTip into `lpszText` in the `TOOLTIPTTEXT` structure (80 is the maximum for ToolTips). The last line returns `TRUE` to let the framework know we have a valid ToolTip to display.

Now build the project. You should have zero errors, zero warnings. Execute the program and test the *About ToolTip* dialog box. Pause the cursor over the *Telephone* edit box to see the ToolTip pop up, as in Figure 2.

OBJECT-ORIENTED SOLUTION

The above solution works well for a single dialog box, but what if your application has dozens of dialog boxes? You'd have to do a lot of cut-and-paste to implement ToolTips in each dialog box. Also, what happens if there is a bug in the logic or you want to change something after doing all that cut-and-paste?

A better solution is to create a new ToolTip-enabled class that dialog classes can inherit from. If you're new to creating your own classes in MFC, this will be an easy introduction to

the process. And if you're a guru, this should be a pleasant stroll down memory lane.

We'll create a new `CTTDialog` class to handle all the ToolTip-related functions. We'll copy what we need from `CAboutDlg` into `CTTDialog` and clean things up as we go. First, use ClassWizard to create a new class. Press `Ctrl-W` to start ClassWizard and click on *Add*

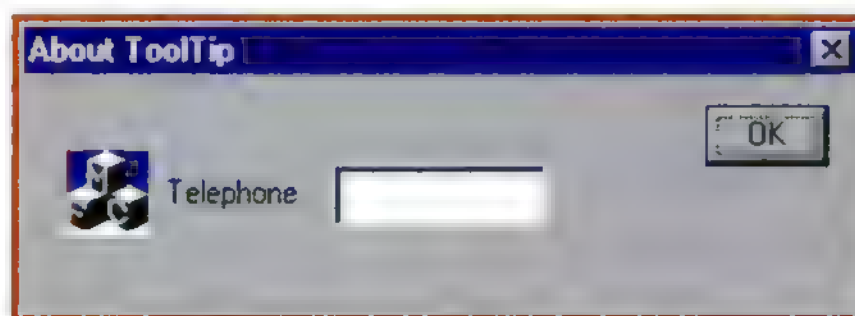


FIGURE 1: A simple dialog box. The ToolTip is not yet implemented.

Class | New. Type `CTTDialog` for the name and select `CDialog` as the base class. Click *OK*. If ClassWizard barks about an unknown resource ID, click *OK*. We'll take care of that shortly. Click *OK* to exit ClassWizard.

Double-click on the `CTTDialog` class in the *Class View* tab of the project workspace to open `TTDialog.h`. Change the `CTTDialog()` constructor to read:

```
CTTDialog(UINT uID, CWnd* pParent =
NULL); // NON-standard constructor!
```

A user-created dialog class (in this case `CAboutDlg`) passes an embedded resource ID (`IDD_DIALOG`) in the constructor of `CDialog`. We accept this resource ID as the first parameter for the `CTTDialog` constructor. Now click on the `CAboutDlg` class in *Class View*, and then cut this line to the clipboard:

```
BOOL OnToolTipText(UINT, NMHDR*
pNMHDR, LRESULT*);
```

Use `Ctrl-Tab` to switch back to `TTDialog.h` and paste the line at the same place into `TTDialog.h`, just before the `DECLARE_MESSAGE_MAP` macro. While you're at it, delete the line reading `{ IDD = _UNKNOWN_RESOURCE_ID_ }`; if ClassWizard put that in as part of the warning from step one above.

Switch back to `CAboutDlg`, go to the top of the file near the other `#includes`, and add `#include "TTDialog.h"`. Page down in the file and change the class derivation for `CAboutDlg` to `CTTDialog`. The class derivation should be:

```
class CAboutDlg : public CTTDialog
```

Scroll down in `CAboutDlg` and cut the line:

```
ON_NOTIFY_EX(TTN_NEEDTEXT, 0,
OnToolTipText)
```

Open `TTDialog.cpp` and paste the line into the message map. Switch to `CAboutDlg` and cut the entire `OnToolTipText` function. Now switch back to `TTDialog.cpp` and paste the function into the bottom of the file. Change the class name from `CAboutDlg` to `CTTDialog` at the beginning on the `OnToolTipText` function definition. Switch again to `CAboutDlg` and cut the `EnableToolTips(TRUE);` line from the `OnInitDialog()` function.

Start ClassWizard, pick `CTTDialog` as the class name, and highlight the `WM_INITDIALOG` message and click *Add Function*. Then click *Edit Code* and paste the `EnableToolTips(TRUE);` line into `CTTDialog::OnInitDialog()`. Scroll up in `TTDialog.cpp`. Change the `CTTDialog::CTTDialog` constructor to read:

```
CTTDialog::CTTDialog(UINT uID, CWnd*
pParent /*=NULL*/)
: CDialog(uID, pParent)
```

The function body remains empty. Close and save `TTDialog.cpp`. Now switch back to `CAboutDlg` and change all references to `CDialog` to `CTTDialog`. Close and save.

Rebuild the project. If you have any errors, work through the steps carefully, making sure you've followed all of them correctly. Try out the new application. The ToolTips should display on the *Telephone* field, just as they did before.

Just for the fun of it, add a string resource for `IDOK`. The caption could be "Save and Exit" or something similar. Rebuild the project. When you pause on the *OK* button in the *About Dialog* box, the "Save and Exit" ToolTip should be displayed.

Now we're ready to leverage our investment in the `CTTDialog` class. To show you how easy it is the second time around, let's create a new dialog box with ToolTips enabled. First, insert a new dialog resource into your project. Click *Insert | Resource*, highlight *Dialog*, and click *New*. A new dialog resource, `IDD_DIALOG1`, is added to the project. Start ClassWizard and create a new class. Call it `CDialog1` and click *OK*. Click *OK* again to exit ClassWizard.

Open `Dialog1.cpp` and change all occurrences of `CDialog` to `CTTDialog` (there should be three occurrences). Close and save `Dialog1.cpp`. Open `Dialog1.h` and change `CDialog` to `CTTDialog` (one occurrence). Add `#include "TTDialog.h"` before the class derivation in `Dialog1.h`. Close and save `Dialog1.h`. For completeness, add a string table entry for `IDCANCEL` with a caption of "Cancel and Exit."

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Use the resource editor to add a command in the View menu called *Display Dialog1*. Use ClassWizard to catch the command in the CMainFrame class and display CDialog1 modally. Now open MainFrm.cpp and add #include "Dialog1.h" at the top of the file near the other #includes. Go to CMainFrame::OnViewDialog1(). Replace the comment in the body of the function with these lines:

```
CDialog1 dlg;  
dlg.DoModal();
```

Rebuild the project and test. You should see ToolTips for the *OK* and *Cancel* buttons for your new dialog.

With the CTTDialog class it's easy to enable ToolTips in a dialog box. First, you create the dialog box just as you normally do. Second, you add string table entries for each of the controls that are unique to the dialog box. Any of the shared IDs (like IDDOK, IDCANCEL, and so on) are entered once in the string table. Third, you #include TTDiallog.h at the top of the header file and change all occurrences of CDialog to CTTDialog in the header and implementation files of the dialog. One last thing: If you use OnInitDialog, remember to reroute the base class call to CTTDialog.

A FEW CONSIDERATIONS

- **Static text.** Usually you don't need ToolTips for static-text controls. That's the assumption MFC makes and the reason why it doesn't

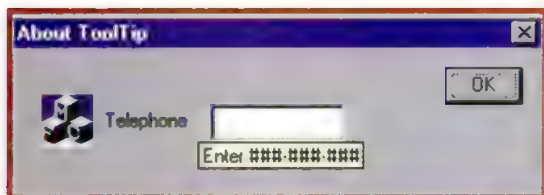


FIGURE 2: Now the ToolTip pops up when the cursor is paused over the Telephone edit box.

send TTN_NEEDTEXT notifications for a control with an ID of IDC_STATIC. If you want ToolTips for static-text controls, you must change the ID from IDC_STATIC to something else. The string table is used for the ToolTip text as with the other controls.

- **Simple and drop-list combo boxes.** This is "extra credit" territory. If you're obsessed with creating the very-best user interface, you'll be unhappy to learn that ToolTips don't work for two of the three styles of combo boxes. The problem is caused by the creation of "extra" controls for the simple and drop-list styles. The combo box you create in the resource editor actually becomes the parent of

a second control that displays the list of entries in the combo box. Fortunately, there is a solution. You need to use the EnumChildWindows callback function to resolve this. Unfortunately, there isn't room to present the solution here, so it is left to the reader as an additional exercise.

PROPERTY PAGES

We can apply the same object-oriented solution to property pages that we used with dialog boxes. Property pages are created in the resource editor the same way that dialog boxes are created. You lay out the controls and then use ClassWizard to create a new class for the page. The base class is CPropertyPage instead of CDialog. Since the MFC documentation is fairly detailed on the process of creating property pages and property sheets, I won't duplicate it here.

As before, we'll create a CTTPropertyPage class to add the ToolTip feature. Use ClassWizard to create a new class. Call the new class CTTPropertyPage and use CPropertyPage as the base class. Click *OK* if ClassWizard complains about not having a dialog resource for the class. Add a function for the WM_INITDIALOG message, then click *OK* to exit ClassWizard.

Using our CTTDialog class as a source, we'll paste lines from it into the CTTPropertyPage class. Here's a tip I find really handy when copying from one file to another: Close all open windows, double-click on CTTDialog and CTTPropertyPage in the *Class View* tab, and click on the *Windows* menu and select *Tile Vertically*. If you've done this you now have TTDiallog.h and TTPropertyPage.h displayed side by side in Developer Studio.

Add a second constructor to TTPropertyPage.h below the first one. It should read: CTTPropertyPage(UINT uID): (leave the default constructor alone in TTPropertyPage.h). Go down a few lines and delete the line enum { IDD = _UNKNOWN_RESOURCE_ID }; in TTPropertyPage.h if it's there.

Scroll down a few lines in TTDiallog.h and copy the line BOOL OnToolTipText(UINT, NMHDR*, LRESULT*);, and paste it into the same place in TTPropertyPage.h. Close and save TTPropertyPage.h and close TTDiallog.h.

Open TTDiallog.cpp and tile it vertically alongside TTPropertyPage.cpp. In TTPropertyPage.cpp copy the default constructor and paste it back in below the original one. In the first constructor, delete the CTTPropertyPage::IDD parameter from the call to the

base class CPropertyPage so there are no parameters in this call. Also delete the three lines starting with ((AFX_DATA_INIT(CTTPropertyPage)) in this first constructor. In the second constructor, change the function definition to read:

```
CTTPropertyPage::CTTPropertyPage(UINT uID) : CPropertyPage(uID)
```

After you're all done the lines should read:

```
CTTPropertyPage::CTTPropertyPage() :  
CPropertyPage()  
{  
}  
CTTPropertyPage::CTTPropertyPage(UINT uID) : CPropertyPage(uID)  
{  
    ///((AFX_DATA_INIT(CTTPropertyPage))  
    // NOTE: the ClassWizard will add  
    member initialization here  
    ///)AFX_DATA_INIT  
}
```

Scroll down in TTDiallog.cpp and copy the message-map entry ON_NOTIFY_EX(TTN_NEEDTEXT, 0, OnToolTipText) into TTPropertyPage.cpp. Copy the EnableToolTips(TRUE); line from CTTDialog::OnInitDialog() to CTTPropertyPage::OnInitDialog(). Scroll down and copy the whole function CTTDialog::OnToolTipText to the end of TTPropertyPage.cpp. Change CTTDialog to CTTPropertyPage in TTPropertyPage.cpp.

Compile the project to make sure you have no typing mistakes.

Now the CTTPropertyPage helper page is ready to be used with any property pages you create. Change the inheritance to CTTPropertyPage, change all references from CPropertyPage to CTTPropertyPage, and #include TTPropertyPage.h at the top of the header file. One thing to remember is that if you want ToolTips for the *OK*, *Cancel*, and *Apply* buttons at the bottom of the property sheet, you have to beef up the PropertySheet class to EnableToolTips and catch the TTN_NEEDTEXT notification.

You can download the source code for this article from *PC Magazine's* Web site. Users need (and demand!) software that can be learned without referring to a printed manual. ToolTips are one of the best ways your software can meet that need. **PC**

Paul Knaplund is the president of PTEX Systems, which develops software for the medical field. His Windows software development career began in 1984 with the pre-release of Windows 1.0.

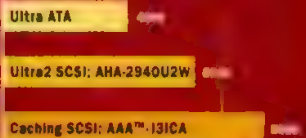
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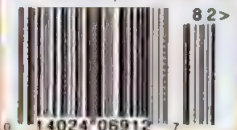
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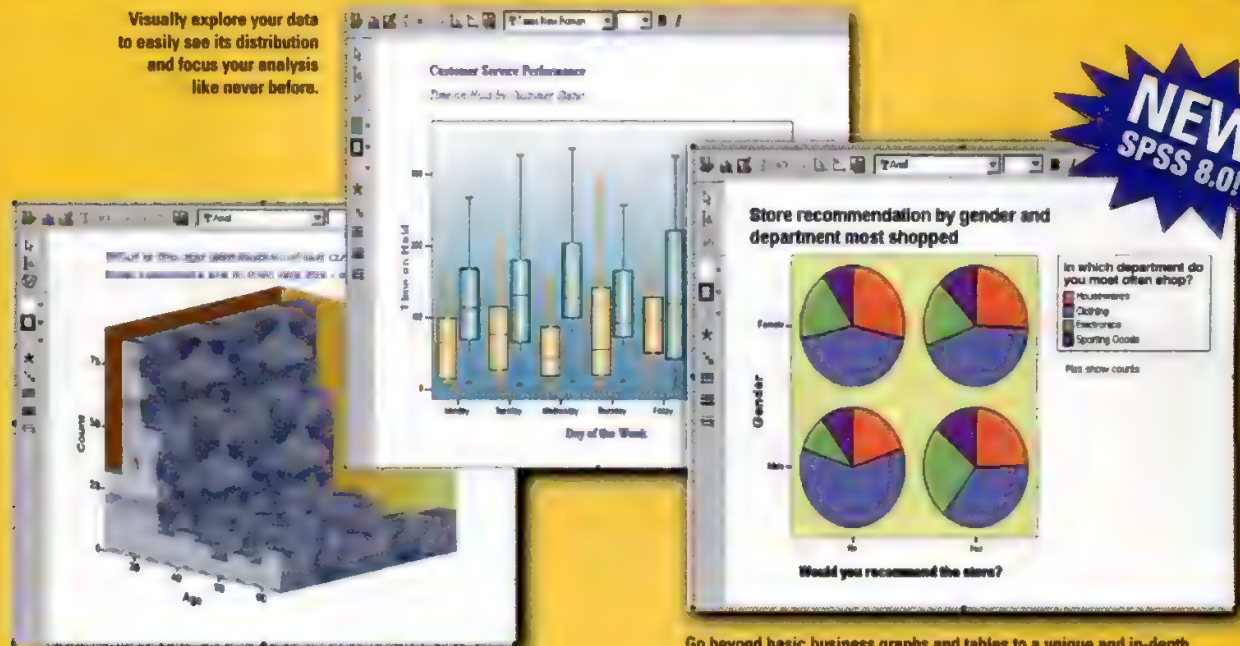
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Create a Personalized Start Page

Page1 gives you a starting point for accessing the World Wide Web.

By Steven E. Sipe

Web portals have attracted a lot of attention lately. A Web portal is a starting point for accessing the World Wide Web; it's a Web site that offers a customizable home base with links to popular sites. For example, you can set your personal page to display local weather and news and sports categories that interest you. While these customizable pages offer many options, they still have somewhat of a "one size fits all" look and feel. For instance, many don't allow you to change the basic links. That's a problem if you want your news or weather from sources other than the ones the Web portal provides.

You always have the option to create your own start page using HyperText Markup Language (HTML). This eliminates the problem of noncustomizable links, since HTML allows you to add and remove links in any manner you see fit. But to do this you need either a working knowledge of HTML or software to make the job easier. If you are looking for a simple way to create a start page with your own list of links, this issue's utility, Page1, can help. It lets you add links to your start page simply by dragging or pasting them from your favorite Web browser. You can also customize the appearance of your start page by selecting the fonts, colors, and bitmaps to use (see Figure 1).

You can obtain Page1 free of charge by download from PC Magazine Online or by mail. Refer to the sidebar "Getting the Files" for details. The source code for Page1, which was written in C++ with Microsoft Foundation Classes (MFC), is also provided

for those interested in seeing how it works. It runs under Windows 95, Windows 98, and Windows NT 4.

USING PAGE1

To install Page1, copy its three program files (Page1.exe, Page1.cnt, and Page1.hlp) to a

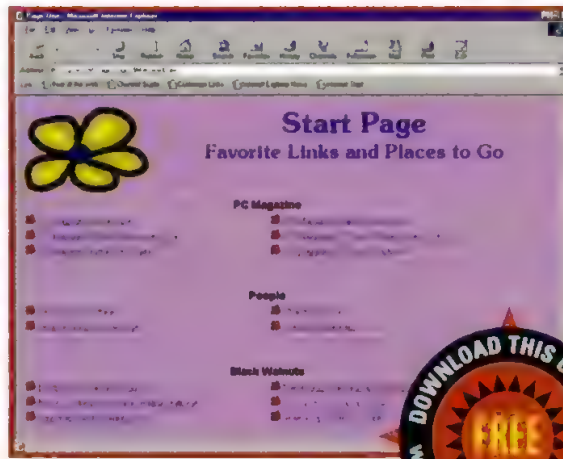


FIGURE 1: This start page generated by Page1 uses customized bitmaps, colors, fonts, and links.

subdirectory on your hard disk. Page1's main window lets you customize the appearance and contents of your start page. It is divided into two sections (see Figure 2). The *Page* section is where you define global characteristics that affect the appearance of your start page. You can specify the page's title by entering it in the *Title* field. The second line in the *Title* field lets you define a subtitle in a smaller font. Click the *Font* button to change the font type, style, or color. The font size is preset to ensure a pleasing layout.

The *Image at Top* field lets you specify an

image to appear in the upper-left corner of the page, beside the page title. Type in the complete path to any graphics file, or use the *Browse* button to find the file on your hard disk. The graphic must be in a file type supported by your browser. Internet Explorer and Navigator both support the display of GIF, BMP, and JPEG files.

The *# Columns* field lets you configure how the links are arranged on your start page. You can choose from one to four columns. If you want a border around each group of links, check the *URL Group Borders* check box.

Click the *Colors* button to customize the colors used for unvisited links, visited links, and the background. This brings up a set of three buttons colored with the current settings. To change an element's color, click on the associated button and select the new color from the dialog.

The lower half of Page1's main window, labeled *URL Groups*, lets you specify the links that will appear on your start page. You can organize your links into groups, up to a maximum of ten groups. Each tabbed page contains a different group.

You can specify a title for each group to be displayed on your start page, and you can also choose an optional bullet image that will appear next to each link. To set these properties, select the tabbed page for the group you want and click the *Properties* button, or right-click anywhere on the page and choose *Group Properties*.

This will bring up the *Group Properties* dialog. Type in the group title, and then click *Font* to select the font type, style, and color. If you want to use bullets, type in the full path of the bullet image, or use the *Browse* button to navigate to it. As with the *Image at Top* bitmap, you must choose a graphics file type that can be displayed in your browser. Page1 will display the bullet bitmap at 16 by 16 pixels, regardless of its original size. But if the original bitmap is very different in size or shape, it may appear distorted.

When you are done making your selections, click *OK*. Now when you move the

For Programmers Only Page1 is a 32-bit Windows application written in C++ with Microsoft Foundation Classes (MFC). It can be compiled with Microsoft Visual C++ 5.0. The full source code for Page1 is available from PC Magazine Online (www.pcmag.com/pctech) and demonstrates several interesting programming techniques, including how to

- dynamically generate HTML code;
- let Page1 be a drop target for URL shortcuts;
- customize the common font dialog.

Support Help for PC Magazine's free utilities can be obtained in our online discussion areas, both on the World Wide Web (www.pcmag.com/discuss.htm) and on ZDNet in the Utilities section of ZDNet's Tips Forum (GO ZNT:TIPS). The authors of current utilities generally visit this forum daily. You may find an answer to your question simply by reading the messages posted in the forum. If the author is not available and the forum sysops can't answer your question, the Utilities column editor, who also checks this forum each day, will contact the author for you.

mouse cursor over a group number, you'll see a ToolTip displaying the group's title. The title also is displayed on the status bar.

Each tabbed page contains a two-column list of the links in that group, with the description on the left and the URL on the right. The description is what appears on your start page. There are several ways to add URLs to the link list. If you're using Internet Explorer 4, you can add new entries by dragging them from the *Favorites* menu or the *Organize Favorites* dialog to Page1's group list box. You also can drag items directly from the *Favorites* sub-menu of the *Start* menu or from the Favorites folder from within Windows Explorer. If you're a Navigator user, select a group of URLs in Navigator's *Goto Bookmarks* window, copy them to the clipboard, and then paste them into Page1's link list by pressing Ctrl-V or selecting *Edit | Paste* from the main menu. With either browser, you can add the current page to the list by copying the URL to the clipboard and pasting it into Page1. To add a link that isn't already bookmarked, select *Add* from the *Link* menu and type in the description and URL.

To delete one or more links, start by selecting them. You can then press the Del key, click the *Remove Link* button on the toolbar, or select *Edit | Delete* from the main menu. To reorder links within a group, drag a link to its new position, or select the link and use the *Up* and *Down* buttons. Page1 also makes it easy to move a link to a different group. You can drag the link onto the tab of the new group, or you can select the link and use Page1's cut-and-paste features. The cut-and-paste commands are available from the right-click context menu and from the *Edit* menu. You can also use the standard Windows key combinations Ctrl-X and Ctrl-V.

Since Web page creation is a visual task, Page1 offers an easy way to preview changes as you make them. You can see a preview of your current project by choosing *Preview* from the *Page* menu. This loads a temporary copy of the current page into your default Web browser, but it does not save the page to disk. Note that you must specify the full path for any graphics files that your page uses. Page1 creates the temporary preview page in the current working directory, which is probably not where your graphics files reside.

The information about how to construct the start page that you enter into Page1's various dialogs and controls is stored in the form

of a project file. Choose *Project | New* to create a new project. Choose *Project | Save* to save your current project. To save the project under a new name, choose *Project | Save As*. To make changes to a previously saved project, select *Project | Open*. This loads the project into Page1, where you can make changes.

When you're satisfied with the appearance of your new start page, you can save it to disk by choosing *Generate* from the *Page* menu. You can save the start page anywhere on your computer. Note that if you do not store the graphics files it uses in the same directory as the page itself, you will need to specify the full path for each of them.

After you've saved your start page, you may wish to make it the home page in your Web browser—the page loaded when you first launch the browser. To accomplish this in Internet Explorer 3, select *View from Internet*

shows components to generate HTML code.

For the most part, generating the HTML code was a straightforward process. Page1 writes the HTML statements to a text file. There is nothing particularly unusual about the HTML code that Page1 generates, so I won't discuss that here. It's interesting to note, however, that the RGB format used by HTML pages is different from the one used by Windows.

To define a bright-red background color in HTML, we would use the parameter `BGCOLOR = #ff0000`. The Windows version of an RGB value is a `COLORREF` variable. As an experiment, store the same color in a `COLORREF` variable called `rgbMyValue`, then call `printf("BGCOLOR = #x06x", rgbMyValue)`. You'll find that the color value is printed as `#0000ff` instead of `#ff0000`. The order of the red and blue values is flipped. The high byte in a `COLORREF` variable is the blue value rather than the red value.

Fortunately, there's an easy way to resolve the differences in byte ordering. The Win32 macros `GetRValue()`, `GetBValue()`, and `GetGValue()` can split an RGB value into its three basic parts. Page1's `MakeColorString` method makes use of these macros, then reassembles the pieces in HTML's RGB format.

ADDING URLS

Page1 lets users add URLs to the link lists in several different ways. From a programming perspective, the most interesting is the

ability to drag and drop from Internet Explorer's *Organize Favorites* window. When you begin dragging a URL, Internet Explorer packages it in the form of a COM object. This COM object exposes the `IUniformResourceLocator` interface, which lets you maintain and retrieve information about a specific URL shortcut.

For Page1 to receive dropped URLs, it must first indicate to Windows that it wants to become a drop target. Since a URL object is actually a URL shortcut file, it does this by calling MFC's `CWnd::DragAcceptFiles` method with a parameter of `TRUE`. This causes Windows to send a `WM_DROPFILES` message to the list control when URLs are dropped on Page1.

The `OnDropFiles` method of the `CPOL1st` object processes the `WM_DROPFILES` message. This message's `wParam` is the handle of a Windows internal structure that contains information about the dropped files. Page1 passes this handle to the Win32 function `DragQueryFile`, to determine how many files are in the struc-

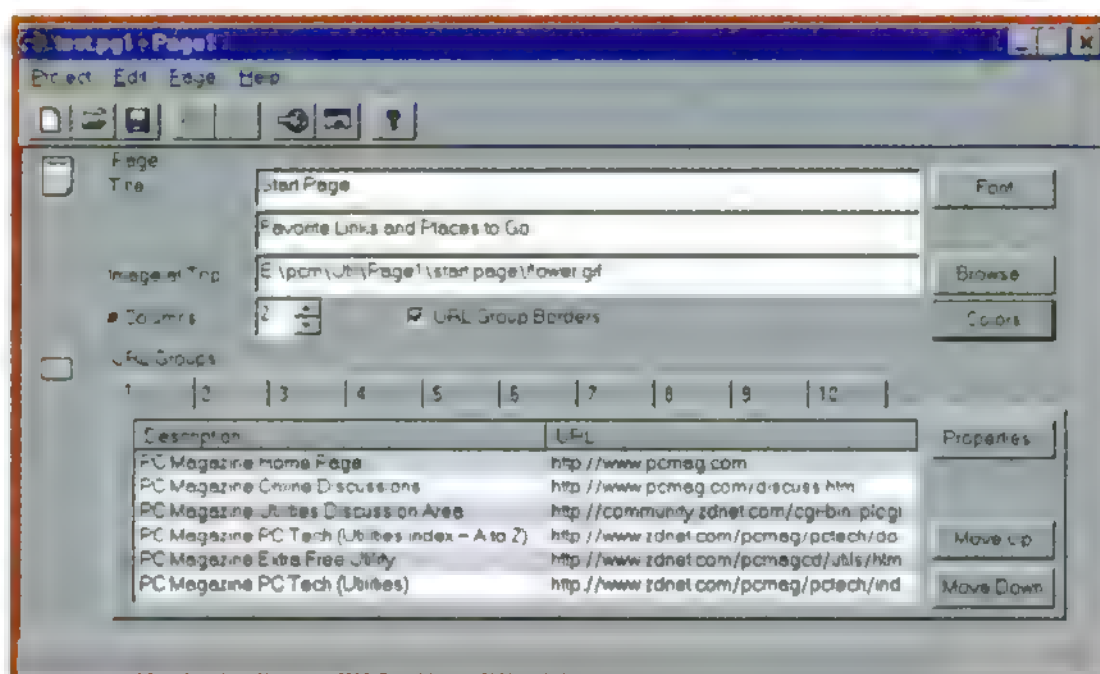


FIGURE 2: Page1 lets you configure the appearance of your start page and add groups of links, without writing any HTML code.

Explorer's *Options* menu. Next, select the *Navigation* tab and enter the start page's complete path in the *Address* field. In Internet Explorer 4, select *View | Internet Options* and enter the path for the start page in the *Home Page* section on the *General* tab.

If you're using Navigator 3, choose *General Preferences* from Navigator's *Options* menu. After this, click the *Home Page Location* radio button, then enter the page's full path in the *Browser Starts With* field. For Navigator 4, select *Edit | Preferences* and highlight *Navigator* in the tree to the left. In the group of radio buttons labeled *Navigator starts with*, select the *Home Page* radio button. Then enter the path for your start page in the group labeled *Home page*.

INSIDE PAGE1

Writing Page1 offered two main challenges. First, I had to provide convenient ways to add URLs to the link lists. Second, I had to use information gathered through standard Win-

ture and to extract the filename for each. It passes `0xFFFFFFFF` (-1) as the second parameter to get the number of files that have been dropped. Once it has this number, Page1 calls `DragQueryFile` in a loop, passing each available index to retrieve the name of that dropped file. For many programs, retrieving the filename is all that's necessary. In Page1, however, the filename gives only the description for the link. To get the actual URL, Page1 must do more work.

Page1's `ResolveURL` method parses and decodes the URL contained in the file whose name was returned by `DragQueryFile`. First it calls the Win32 function `CoCreateInstance` to create an instance of a standard `CLSID_InternetShortcut` COM object and get a handle to its `IUniformResourceLocator` interface. Next, it obtains an interface pointer to the object's `IPersistFile` interface. Many COM objects that need the ability to load and store disk-based data expose the `IPersistFile` interface. Remember, these URL objects are actually standard Windows shortcut files that reside on-disk. `IPersistFile`'s methods include the ability to load and save file-based data, indicate whether the data has been modified, and return the current filename. Of these, Page1 calls only the `Load` method.

Page1 calls the `Load` method of the `IPersistFile` interface to connect the specified file with the COM object. If that step is successful, it calls the interface's `GetURL` method to retrieve the URL contained within the file. URL files on-disk are stored as text files in a form similar to that of an INI file, so it might seem easier just to read the text file. However, using `IPersistFile` to read their contents is the recommended technique, as this insulates the caller from potential changes in the shortcut file's format.

A CUSTOMIZED FONT DIALOG

The HTML `<FONT>` tag lets you specify a font's typeface, color, and size. Other HTML tags, such as `<UL>` (underline), work in conjunction with the `FONT` tag to specify font attributes such as bold, underlined, and italic.

Page1 uses the Windows common font dialog to provide the user with a visual way to choose font attributes. The user can define three characteristics for each font: typeface, style (bold, italic, or underlined), and color. Page1 converts these attributes into HTML statements. The only font attribute that's not configurable by the user is the font size. Page1 controls the font size so that the page will have a uniform appearance.

The standard Windows common font dia-

Page1 lets you create attractive, custom start pages and provides quick, efficient ways to modify them as your needs and interests change.

log lets users configure several additional attributes. These extra options presented a problem for Page1. I didn't want to present a font-selection dialog where half of the options would have no relevance.

One option would have been to write my own font-selection dialog. While this would have required me to implement only a few controls, as owner-drawn controls they'd have been complex to implement. If you want a control to display plain text all in one font, then you don't need an owner-drawn control. But if you want to use pictures instead of text, or different fonts on different items, you need to take over the drawing of the control yourself.

For example, the list box from which the user selects the font type is owner-drawn. This enables the list box to display a symbol to the left of each font that indicates whether it's a TrueType, printer, or display font. The

color-selection combo box, which has a list of available colors augmented by a sample, is also owner-drawn. These are complex controls to implement.

Fortunately, the designers of the Windows common-dialog routines thought about the need for this type of customization when they originally implemented the common-dialog code. The Windows functions that invoke the common dialogs include a flag to indicate you're providing a custom dialog template. Using the original font-selection dialog as a starting point, you can arrange the controls in any way you'd like. The only restriction is that you can't remove or change the IDs of any controls. This restriction isn't generally a problem; you can always hide and disable controls instead of removing them.

Page1 uses this feature to create a stripped-down version of the font dialog. First it sets the flag that indicates that it's using a custom dialog template. MFC's `CFontDialog` class, a wrapper for the Windows common font dialog, contains a data member called `m_cf.Flags` for passing flags to the common font-dialog routines. Page1 tells the common routines to use the custom dialog template by setting `m_cf.Flags` to `CF_ENABLETEMPLATE`. Next, it specifies the custom dialog's ID by assigning the ID to the data member `m_cf.lpTemplateName`. Finally, it specifies the application's instance in the data member `m_cf.hInstance`. Page1 must specify the instance handle so Windows can properly load the font-selection dialog from Page1's resource file.

Page1 lets you create attractive, custom start pages without having to learn HTML code or buy expensive tools. It also provides quick and efficient ways to modify these views as your needs and interests change. The next time you find yourself staring blankly at your Web browser's default starting page, think about giving Page1 a try. **PC**

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User-to-User

BY NEIL J. RUBENKING

A Better Way to Get the Date in a Windows NT 4 Batch File

In the issue of June 9, 1998, the technique suggested for setting date variables from a Windows NT batch file [online at www.pcmag.com/pctech/content/solutions/uu1711a.htm] is neat, but it misses one additional command extension that eliminates the need for a recursive call. Windows NT allows the use of parentheses to group a set of commands to be executed conditionally. Thus, `Mmddnt.bat` can be simplified as shown in Figure 1.

BRETT MIDDLETON
Athens, Georgia

PC MAGAZINE: It's worth repeating: The Windows NT command prompt is not a DOS box. Many commands have the same names, and some work the same as in DOS, but others (like the `FOR` command) are vastly enhanced.

The `FOR` command in `Mmddnt.bat` takes as its input the output of the command `date /t`. It separates each line of input into tokens using the forward slash and space as delimiters, and it assigns tokens 1-4 to variables. The command specifies `%i` as the `FOR` variable; the other three are automatically named `%j`, `%k`, and `%l`. Finally, the command executes all the instructions in the parentheses using these variables.

In use, you'll omit the `ECHO` lines at the end

```
@ECHO OFF
```

```
for /F "tokens=1-4 delims=/ " %i in ('date /t') do (
    set DayOfWeek=%j
    set Month=%k
    set Day=%l
    set Year=%i
    set Date=%i %j/%k/%l
)
```

```
ECHO Date is %Date%
ECHO Day of Week is "%DayOfWeek%", Month is "%Month%"
ECHO Day is "%Day%", Year is "%Year%"
```

FIGURE 1: Under Windows NT's command processor, the `FOR` command can execute a group of commands contained in parentheses.

and use the `CALL` command to call `Mmddnt.bat` from another batch file, then manipulate the environment variables for your own purposes. For example, to rename the file `Temp.txt` to the current date in `yyyymmdd` form, you'll write:

```
@ECHO OFF
CALL MMDDNT.BAT
REN TEMP.TXT %Year%%Month%%Day%.TXT
```

You'll often find that you can make an existing DOS batch file significantly more efficient by taking advantage of the enhancements available under Windows NT.

Prevent Automatic Disk Scanning

Microsoft Windows 95 OSR2 has a somewhat annoying feature: If the system shuts down in some nonstandard way (as when a program crashes), the next time you boot, the system will run `ScanDisk` before starting. While this isn't necessarily a bad idea, it's not usually necessary, and it lengthens the boot process while monopolizing the system. Also, you may have some other scanning program you prefer and would like to run at your convenience. In my case, `ScanDisk` has never managed to find an error, though it chugs along interminably.

You can turn this feature off by editing the `Msdos.sys` file in the root directory. First, turn off the file's hidden, read-only, and system attributes either through Windows Explorer or at the C: prompt by typing `attrib -h -r -s msdos.sys`. Then open the file in any text editor, search for the [Options] section, and add the line `AutoScan=0`. Save the file, reset the attributes (`attrib +h +r +s msdos.sys`), and reboot as usual.

The default setting for the `AutoScan` switch is 1, which checks for a bit in the boot drive's Master Boot Record, which is reset every time Windows shuts down normally. If it has not been reset, then `ScanDisk` runs. If you are truly paranoid, you can type `AutoScan=2`. With this setting, `ScanDisk` will run every time the computer boots. This is probably useful if your hard disk is about to go south.

It is of course possible that an unusual shutdown can leave cross-linked files or bad FAT entries. Also, if the shutdown occurred because of a disk error, it is possible that the disk has developed a bad sector. So even if you don't let `ScanDisk` run, it is a good idea to run it or some other such program as soon as possible.

PAUL J. CAMP
Surfside Beach, South Carolina

PC MAGAZINE: The free PC Magazine utility

`BootOpt` (www.pcmag.com/pctech/content/15/16/ut1516.001.html) can be used to control most Windows 95 start-up options without resorting to direct editing of `Msdos.sys`. `AutoScan` is an exception, as it was introduced in Windows 95 OSR2, well after `BootOpt`'s creation.

Note that `Msdos.sys` is arranged like an INI file, with keys of the form `name=value` organized under section headers of the form [section]. Carefully check the [Options] section to see whether an `AutoScan=` key is already present. If it is, don't add another—just change the existing key to the value you want. Typically, `Msdos.sys` will contain a large number of comment lines containing nothing but small x's. These lines serve to "bulk up" `Msdos.sys` to over 1024 bytes. Be sure to look both before and after this comment block. And if your system does crash, remember to run `ScanDisk` or an equivalent utility at your earliest convenience.

Redialing in Windows NT Dial-Up Networking

When discussing setting up Dial-Up Networking to redial automatically [as in the issue of May 26, 1998; online at www.pcmag.com/pctech/content/solutions/uu1710b.htm], the common assumption seems to be that everyone is using Windows 95. But many of us prefer Windows NT 4.0, and NT works differently.

You won't find a Dial-Up Networking folder in Windows NT Explorer. Instead, double-click My Computer on the Windows desktop, then double-click Dial-Up Networking. In the Dial-Up Networking dialog box, choose More, then User Preferences. Now you see a dialog box (somewhat similar to the one in the earlier item) where you can set the redial parameters. One interesting point is that you can also check Redial on Link Failure—something you can't do in Windows 95.

GORDON PADWICK
via the Internet

PC MAGAZINE: Windows NT 4 and Windows 95 look so similar and act alike in so many ways that it's easy to forget their areas of significant difference. Networking and communications is one area where Windows NT is far ahead; security is another. In addition to the Dialing tab described above, the User Preferences dialog includes settings for callback connections, a number of options affecting the appearance and behavior of the system when starting a DUN connection, and a choice of phone books.

Write On.

(and on, and on, and on).



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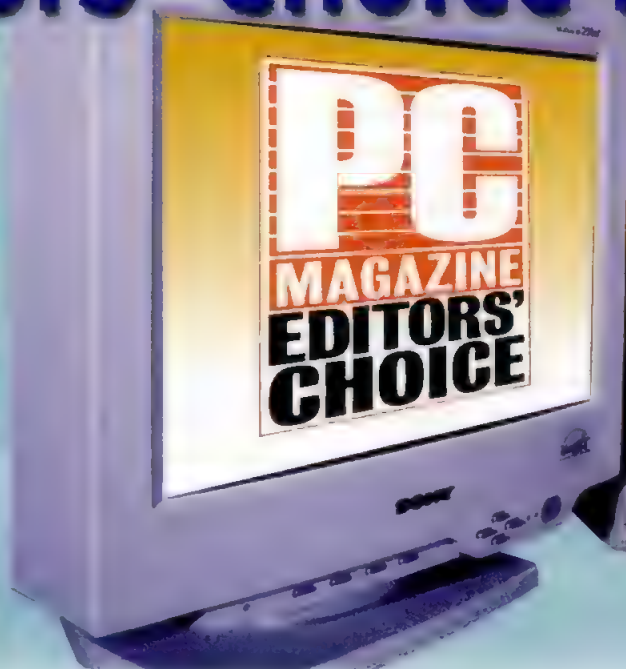


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Siren's Song?

The 24X CD-ROM drive that came installed in my new desktop system makes a loud humming sound when it's in use. I spoke with one of the computer maker's technical-support staff, who said that the humming noise is normal, because of the high-speed spinning of the drive. Is this true? Or is the drive defective or out of alignment? When I'm using my CD-ROM drive, my workmates are wondering what in the world I'm doing, because even they can hear the humming!

GENE WONG
via the Internet

PC MAGAZINE: It's true that a 24X does spin more rapidly than slower drives and that this can make more noise during operation, but there may be something you can do to alleviate the problem.

First, if the drive is able to read data reliably, then it probably is not defective. CD-ROM drives spin at different rates depending on which portion of the disk they are reading.

In addition, to save the drive's motor and to save power, most high-speed CD-ROM drives spin down when idle. As a result, when you try to access the drive, it must start by getting up to speed. This can take some time and may produce noticeable noise. If you perform a function that will cause the head to move rapidly to different regions of the disk, the drive will be forced to speed up and slow down repeatedly. This can create a wailing effect like an emergency vehicle's siren, and again it is perfectly normal.

What may not be normal is that something may be causing the sounds to radiate more effectively in your system than is necessary. Here are some steps to try to reduce the problem:

Take the case off and see whether the drive is mounted securely in its bay. If it's loose, it may be shaking and creating extra noise in the process. If the drive is firmly mounted, consider removing the drive and placing a damping material between it and the bay. Try using a section of rubber band or a portion of a bicycle inner tube, or some plastic foam such as that you find in some mailers. This may prevent the drive's vibrations from being transmitted as effectively to the walls of the drive bay, and it may reduce the overall sound level when you're using your CD-ROM drive.—*Alfred Poor*

OPERATING ENVIRONMENTS

Moving E-Mail Folders Between Systems

I use Windows 95 and Internet Explorer 3.01 on two Pentium PCs. All e-mail messages and attachments are saved on the hard disks of both machines as Inbox.idx and Inbox.mbx, Outbox.idx and Outbox.mbx, and so on, in the Internet Mail & News folder. I can copy files from one machine to another, but there appears to be no way to append individual new e-mails and attachments onto the base file to create a composite.

However, since I receive a lot of e-mail with large attachments, the total size of these files has grown to well over 100MB and has begun seriously cramping my limited laptop hard disk. Is there a way of transferring individual messages and attachments, in their received form, from one computer to another via (say) a utility or tape-backup device? Tech support for both ATTWorldnet (my ISP) and Eudora told me I was the first person to ask such a question. What do other road warriors do if they need to reference e-mail from day one to the present?

MICHAEL FISHER
via the Internet

PC MAGAZINE: This is something I have to do with my own e-mail when I return from a business trip. Here's how I handle it: First, I clean up the laptop's e-mail folders, deleting any unwanted messages and compacting all folders. For each folder whose contents I want to transfer, I create a new folder with a name like Inbox_transfer. Any name will do, as long as it doesn't already exist on either machine. I highlight all messages in the original folder and move them to the newly created folder. When I'm done, all messages that I want to transfer are in one or another of the new folders.

Then I use a long filename-aware compression program to archive the IDX and MBX files for the newly created folders into a single ZIP file, and I transfer that file to my desktop machine. I decompress the file into the directory where e-mail folders reside (in my case, D:\Program Files\Internet Mail and News\Neil\Mail). Then I launch the Mail applet on the desktop machine and move the messages from the transfer folders into existing folders. As a final step, I delete the now-empty transfer folders.

If you always use one machine or the other,

never both at once, you may want to transfer the address book each time you switch machines. The address book file resides in your Windows directory. Its extension is .wab, and its name is your log-on name, so if you use different log-on names on the two machines, you'll have to take that into account. Before going out on the road, transfer the WAB file from desktop to laptop. Upon return, transfer it back to the desktop. That way any new entries you've added will be available on both systems.—*Neil J. Rubenking*

Don't Waste Space on Redundant ZIP Files

This may sound silly, but do you need to keep a ZIP file after you extract the individual files? I don't want to keep unnecessary files, but I'm wondering whether the expanded files need the ZIP file in any way.

LARRY LAFF
via the Internet

PC MAGAZINE: A ZIP file is nothing more than a container for the files archived within it. Once you have extracted those files, they have no further connection with the ZIP file. After

OUR ADVISORS

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*Windows 95 †Windows NT

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you verify that the extracted files are correct and complete, you can safely delete the ZIP file. If the ZIP was a large and difficult download, however, you might want to archive it onto floppy disks first. That way if you need to reinstall the program, you won't have to suffer through the download again.

Do be sure to double-check the extracted files before tossing the ZIP container. There are a couple of things that can go wrong even when the decompressing process seems to have been successful. Modern compression utilities correctly handle long filenames, but older DOS-based utilities do not. If you use an older utility to extract a ZIP file that contains long filenames, the resulting filenames will be truncated. If two files have names that are identical in the first eight letters, you'll be able to extract only one of them. To be safe, always use a modern decompression utility.

Also, ZIP files can optionally include the directory structure of the original files. If you fail to set the correct options when decompressing such a file, you can wind up putting all the files in the same directory. Chances are good that the program won't work then, because it won't be able to find its ancillary files. Also, if different directories contain files with the same name, you'll be able to extract only one of them. Always set the option that re-creates any directory structure found in the ZIP; if there is no directory structure, this switch is harmless.—Neil J. Rubenking

WORD PROCESSING

Entering a Calculated Date In Word

Is there a way to enter today's date in one paragraph of a letter in Word 7 and, in the next paragraph, automatically enter a date that equals today's date plus 60 days? I tried linking Excel, but that, to say the least, was not too efficient. I want the date to fall in the middle of a sentence in the middle of a paragraph.

HARRY MCCURDY
via the Internet

PC MAGAZINE: Entering the current date in the first paragraph is simple enough, although you have several choices for how to enter it. The obvious if somewhat clumsy approach is to choose *Insert | Date and Time*, either check the *Update Automatically* check box or not, and then highlight the format you want and choose *OK*. If you check the *Update Automatically* box, Word will enter the date as a field, which will change to match the current date at all times. If you leave the box unchecked, Word will enter the date as text.

You can also automate the date entry using a keyboard shortcut. Choose *Customize* from the *Tools* menu, and click on *Keyboard*. Choose *Insert* in the *Categories* column, and scroll down the *Commands* column until you see *Insert-DateField* to insert a field and *InsertDateTime* to bring up the dialog you get by choosing *Insert | Date and Time*. Assign a keyboard shortcut or toolbar tool to either or both of these.

To create a macro that enters the date, choose *Tools | Macro*, enter an appropriate name (such as *Date*), and choose *Create*. Word will open a macro-editing window. Enter the following line between the *Sub MAIN* and *End Sub* statements that Word supplies:

```
Insert Date$(Today())
```

Then choose *File | Close* and answer yes when Word asks whether you want to save the changes. The one-line command inserts today's date. You can, of course, also assign this to a keyboard shortcut or toolbar tool, using *Tools | Customize*.

To enter today's date plus 60 days—a common time limit for waiting for a response, for example—you can create a similar macro. Follow the same procedure, but this time enter the macro command:

```
Insert Date$(Today() + 60)
```

This first calculates the date 60 days from today's date and then inserts that date.

Be aware that the *Date\$()* function inserts the date using the format defined in the *Date-Format* line in the registry. By default, however, there is no *DateFormat* line. To add it, first make sure Word is closed. Then run RegEdit to edit the registry. Find the registry entry:

```
HKEY_CURRENT_USER\Software\Microsoft\Word\7.0\Options
```

Highlight the *Options* entry, choose *Edit | New | String Value*, and enter the name *DateFormat* for the string value. After you've entered it, double-click on *DateFormat* to open the *Edit String* dialog box, and enter the date format you want to use in the *Value Data* text box. Note that you shouldn't use quotation marks around the date format.

When you're done, chose *OK* to close the dialog box, and then close RegEdit. If you ever want to change the format, you can edit the *DateFormat* entry again with RegEdit. (You can also change it though a macro, but I'll leave that for another time.) As always when using RegEdit, be careful not to make any other changes than the ones you intend to, since you can render your system inoperable.

Finally, Word 97 users should note the equivalent VBA macro for entering today's date is

```
Sub DateEnter()  
TodayDate = Format(Date, "mmmm d, yyyy")  
Selection.TypeText (TodayDate + " ")
```

Note VBA doesn't enter the first *Sub*, which you follow with the macro name. The first line after this defines the variable *TodayDate* as the current date, formatted to take the form "January 3, 1999." The second line inserts the date followed by a space.

Similarly, the equivalent VBA macro for entering the date 60 days from today is

```
Sub DatePlus60  
NewDate = DateAdd("d", 60, Date)  
NewDate = Format(NewDate, "mmmm d, yyyy")  
Selection.TypeText (NewDate + " ")
```

The first *NewDate* line here calculates the date 60 days from today, the second line formats it, and the third line inserts it. All of the macros discussed in this column are available from PC Magazine Online. Download the PC Tech archive file for this issue.—M. David Stone

SPREADSHEETS

Removing Linked Formulas

How do I sever the link between two workbooks in Excel 97?

JAMES C. BANKS
Valhalla, New York

PC MAGAZINE: To get rid of a link, you need to convert the link formula to its calculated value. You do that the same way you convert any other kind of formula to a constant. You can select the formula, press F2, press F9, and hit Enter. Or you can select it, choose *Copy*, and then choose *Paste Special* and use the *Values* option in the *Paste Special* dialog box.

All this is pretty easy if you have only a few links and you know where they are. If you have many, it can be a nuisance, because Excel doesn't offer any simple way to select all the formulas on a worksheet that contain links. (And the *Edit Links* command gives you only the names of your subordinate documents; it doesn't tell you where the link formulas reside.) You would think that the *Go To... | Special* command would provide this option, but it doesn't. Still, *Go To... | Special* can help you.

Choose *Go To...* from the *Edit* menu (or press F5). Then click the *Special* button. In the *Go To Special* dialog box, choose *Formulas*

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(leave all the subordinate check boxes checked). This creates a multiple selection consisting of all the cells on this worksheet that have formulas. You can press Enter to move from cell to cell within the selection. At each step along the way, you can look at the formula bar to see whether the active cell contains a link formula. When you find one, press F2, F9, and Enter to convert the formula to a constant. Then repeat the process until you've got them all.—*Craig Stinson*

DATABASES

Numeric Day of the Year, Year First

I am developing an application in Microsoft Access 97 on a Windows NT 4.0 system that, when completed, will allow my colleagues and me to perform batch updates to our AS/400 system. I have come across a small problem. The dates need to be formatted as Julian (for example, 98001 for January 1, 1998). Currently there doesn't appear to be a straightforward way to do this in Access. A couple of years ago I saw a macro that would do this, but that was then, and this is 98053. Any help would be appreciated.

KEVIN H. NEWMAN
via the Internet

PC MAGAZINE: Even though the term *Julian date* is used this way in many programming circles, it's not literally correct. The term *Julian date* is correctly defined as the number of days elapsed from January 1, 4713 BC, at noon, which is the start of the Julian day calendar. For example, the Julian date (JD) of January 1, 1980 (at noon), is JD 2,444,240.0. (For more on this subject, see Solutions/Databases in the issue of September 10, 1996; online at www.zdnet.com/pcmag/pctech/content/solutions/db1510a.htm.)

In practice, however, the term *Julian date* is often used to refer to the result of any elapsed-days calculation that uses a fixed starting date, such as the beginning of the year. A more appropriate description of such a result would be *numeric day of the year*.

The `DateToYYDDD` function shown in Figure 1 does your conversion. You pass it a date and it returns a string formatted the way you want, in `yyddd` format. Bear in mind, however, that starting in the year 2000 the string returned by this function will begin again with 00 as the first two digits. Thus, December 31, 1999, will return 99365, while January 1, 2000, will return 00001—a lesser value. You'll want to give very careful consideration to how this affects your appli-

```
*****
' Public Function DateToYYDDD(dtmDate As Date)      Access 97
' Converts the passed date to the numeric day of the year in the format
' YYDDD where DDD is in the range 001-366.
*****
Public Function DateToYYDDD(dtmDate As Date) As String
Dim strDayNumber As String, strYearNumber As String
strDayNumber = Format$(dtmDate, "y")
strYearNumber = Format$(dtmDate, "yy")
DateToYYDDD = strYearNumber & Format$(strDayNumber, "000")
End Function
```

FIGURE 1: You can use this function to convert a date into the equivalent numeric day of the year, with the year first (yyddd). Pass it #12/31/98#, for instance, and it returns "98365." However, this function is not year 2000-compliant.

```
*****
' Public Function DateToYYYYDDD(dtmDate As Date)    Access 97
' Converts the passed date to the numeric day of the year in the format
' YYYYDDD where DDD is in the range 001-366.
*****
Public Function DateToYYYYDDD(dtmDate As Date) As String
Dim strDayNumber As String, strYearNumber As String
strDayNumber = Format$(dtmDate, "y")
strYearNumber = Format$(dtmDate, "yyyy")
DateToYYYYDDD = strYearNumber & Format$(strDayNumber, "000")
End Function
```

FIGURE 2: You can use this function to convert a date into the equivalent numeric day of the year, with the year first (yyyyddd). Pass it #12/31/98#, for instance, and it returns "1998365."

cation logic. For example, sorting on these values would place dates in the year 2000 way ahead of where they should be (00001 would move to the front of the result and sort the same as January 1, 1900). For that reason you should consider converting your application to use the `DateToYYYYDDD` function shown in Figure 2.

To make this change to the `DateToYYDDD` function, replace the line that reads

```
strYearNumber = Format$(dtmDate,
"yy")
```

with

```
strYearNumber = Format$(dtmDate,
"yyyy")
```

You'd want to rename the function to `DateToYYYYDDD` too.

Because this function returns a value that starts with a four-digit year, it is year 2000-compliant. The value returned is seven characters instead of five, however, and thus may impact the storage requirements of your application.

Readers interested in learning how the calendar as we know it came about should pick up a copy of *Calendar: Humanity's Epic Strug-*

gle to Determine a True and Accurate Year, by David Ewing Duncan. Published by Avon, the book chronicles seven centuries of man's attempts to make sense of time and makes for some fascinating reading.

The code shown below can be downloaded from www.pcmag.com/download. Look for the file named `Date2yr.zip` in the PC Tech archive file.—*Sal Ricciardi*

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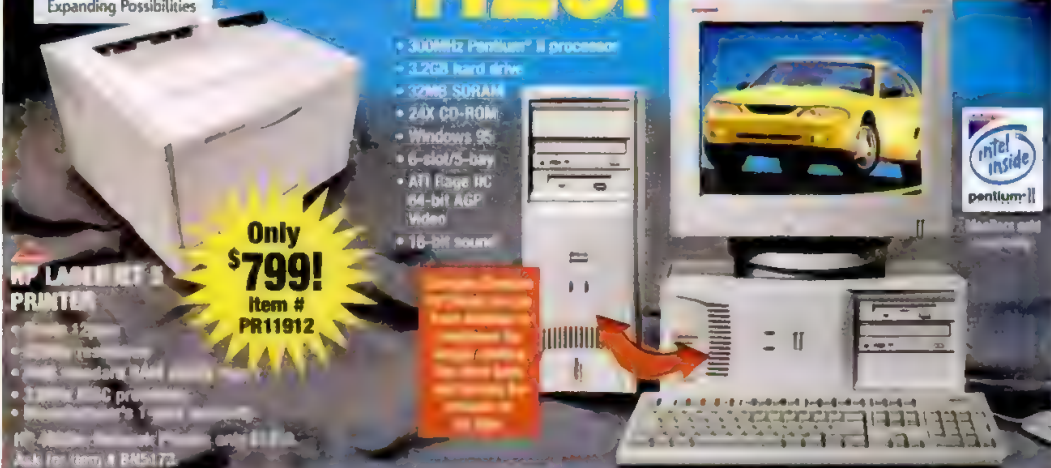
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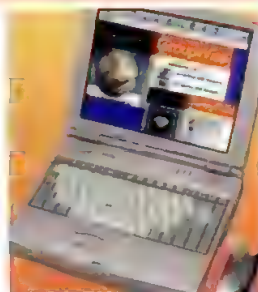
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102356	333Celeron/64MB/6.4GB/32X	1269
102357	350PI/64MB/4.3GB	1278
102358	350PI/64MB/10GB/32X	1629
102359	400PI/64MB/10GB/32X	1779
102360	450PI/64MB/10GB/32X	1889

Compaq EN Desktop

102341	300ACeleron/32MB/3.2GB	\$1099
102285	333Celeron/32MB/3.2GB/10/100	1229
102344	333Celeron/32MB/3.2GB/32X	1149
102291	350PI/64MB/10GB/10/100/WinNT	1749
102280	300ACeleron/32MB/3.2GB/10/100	1189
102347	400PI/32MB/6.4GB	1549
102294	450PI/64MB/10GB/10/100/WinNT	2129
102348	450PI/64MB/9.1GB/32X/WinNT	2599

Compaq EN Minltower

102343	300ACeleron/32MB/3.2GB/32X	\$1229
102346	333Celeron/32MB/6.4GB/32X	1379
102288	333Celeron/32MB/3.2GB/32X/10/100	1479
102286	450PI/64MB/10GB/32X/10/100/WinNT	2049

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Hewlett-Packard Brio

102177	333Celeron/32MB/4.3GB/32X	999
102227	333Celeron/32MB/4.3GB/32X/56K	1249
102229	333PI/32MB/4.3GB/32X/56K	1399
101971	333PI/32MB/8GB/32X	1689
101970	450PI/64MB/8GB/32X	1999

Hewlett-Packard Vectra

102233	266PI/32MB/3.2GB	\$1179
100959	333PI/32MB/4.3GB	1449
101545	350PI/64MB/6.4GB/32X/10/100	1879
100963	400PI/64MB/6.4GB/32X	2049
58873	400PI/64MB/10.1GB/32X/10/100	2899
101312	450PI/64MB/10.1GB/32X	2399

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IBM PC 300 GL Desktop

59583	350PI/64MB/3.2GB	\$1440
59582	400PI/64MB/3.2GB	1680

IBM PC 300 GL Minltower

59580	333PI/32MB/3.2GB	\$1170
59584	350PI/64MB/6.4GB/32X	1680
59585	400PI/64MB/6.4GB/32X	1819

IBM PC 300PL Desktop

54601	350PI/64MB/6.4GB	\$1829
54602	400PI/64MB/6.4GB	1950

IBM PC 300PL Minltower

54606	350PI/64MB/4.2GB	\$1779
54607	400PI/64MB/6.4GB	1979

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Inteva Minltower

1003737	300MIMX/32MB/3.2GB/24X/56K	\$880
100395	266MIMX/32MB/4.3GB	979
100397	266PI/32MB/4.3GB/Windows NT	999
100388	266PI/32MB/4.3GB/32X/56K	999
100396	300PI/64MB/6.4GB	999
100384	300MIMX/32MB/3.2GB/32X/56K	799
100385	333MIMX/48MB/4.3GB/32X/56K	889
100706	333MIMX/64MB/6.4GB/32X/56K	999

100398	333PI*/64MB/6.4GB/32X/56K	1190
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Sony VAIO

58143	266PI/32MB/4.3GB/24X/33.6K	5899
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TOSHIBA

Toshiba Equium

54225	266PI/32MB/4GB/24X/10/100	\$1099
54235	300PI/32MB/4GB/24X/10/100	1159

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102240	233MMX/32MB/3.2GB/20X/56K/12.1"DS	\$1279
57894	233PI/32MB/2.1GB/24X/56K/12.1"DS	1499

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Compaq Armada 1700 Series

103055	233PI/32MB/3.2GB/24X/56K/12.1"HPA	\$1999
58895	233PI/32MB/4GB/24X/56K/12.1"TF	2399
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Compaq Armada 3500 Series

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102989	300PI/64MB/6.4GB/24X/33.6GB/13.3"TF	4995
55276	266PI/64MB/5GB/20X/13.3"TF	3995
102995	300PI/64MB/8GB/DVD/33.6GB/14.1"TF	5399

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102035	266PI/32MB/4GB/24X/56K/13.3"TF	2399
100119	266PI/64MB/4GB/24X/56K/13.3"TF	2999
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IBM ThinkPad 380

101585	233PI/32MB/4GB/24X/13.3"TF	2440
103308	233PI/32MB/4GB/13.3"TF	2599
101586	300PI/32MB/4GB/24X/13.3"TF	2999

IBM ThinkPad 560

41591	166MMX/16MB/2.1GB/12.1"TF	\$1190
101593	233PI/32MB/4GB/56K/12.1"TF	2599
101594	300PI/64MB/6.4GB/56K/12.1"TF	3599
101595	300PI/64MB/6.4GB/56K/12.1"TF	3640

IBM ThinkPad 600

54589	233PI/32MB/3.2GB/24X/56K/13.3"TF	\$2440
100860	233PI/32MB/3.2GB/24X/56K/12.1"TF	2590
54590	266PI/32MB/4GB/24X/56K/13.3"TF	3290
101589	300PI/64MB/5.1GB/24X/56K	3050
101590	300PI/64MB/5.1GB/DPE	4050

IBM ThinkPad 770

101581	300PI/128MB/8.1GB/56K	\$5090
54596	266PI/32MB/5.1GB/14.1"TF	3790
54597	266PI/64MB/8.1GB/56K/14.1"TF	4870
101582	300PI/128MB/8.1GB/24X/56K/WinNT	5090

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101104	233PI/32MB/4.1GB/24X/56K/12.1"TF	1879
103394	266PI/32MB/4.1GB/24X/56K/12.1"DS	1915

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101101	266PI/32MB/4.3GB/56K/12.1"TF	\$2895
102877	300PI/32MB/4.3GB/56K/12.1"TF	3359

Toshiba Tecra

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101323	266PI/64MB/6.4GB/24X/56K/13.3"TF	3349
102863	300PI/64MB/6.4GB/24X/56K/13.3"TF	3645
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Franklin Electronics

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49958	620XL Color Palmtop PC	9999
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51843	Velo 500 16MB w/Dock	499.95*
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42202	Series 5 Palmtop 8MB	\$489.95
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Sharp

48466	Mobile HC-4500	\$649.95
58197	Mobile HC-4600 16MB	699.95
55000	Mobile HC-4100 (Refurbished)	479.95
40469	Digital Camera Card for Mobile	379

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103844	17" 7108	219

EZC International

49292	14" EZ-V1500D	\$159
49293	17" EZ-P1700D	240

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43320	19" Elite 751	\$600
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Iiyama

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40055	19" VisionMaster 450	600
59681	21" VisionMaster 501	900

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710DX 233/PII 32MB 2.1GB 12.1" DS	1497.56
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1700 300/PII 32MB 5GB 14.1" AM 24X	3767.26
3500 266/PII 32MB 4.1GB 12.1" AM	3217.56
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7400 300/PII 64MB 6.4GB 13.3" AM 24X	4097.23
7800 266/PII 64MB 5GB 13.3" AM 20X	3997.56
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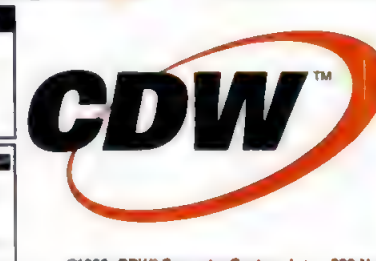
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Peripherals	275.....289
Presentation Equipment	278
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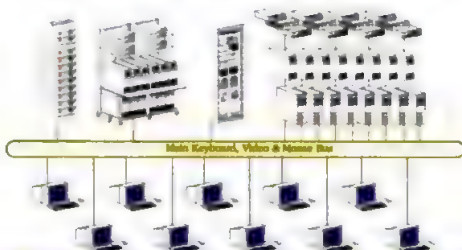
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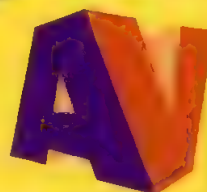
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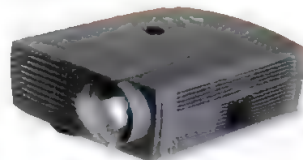


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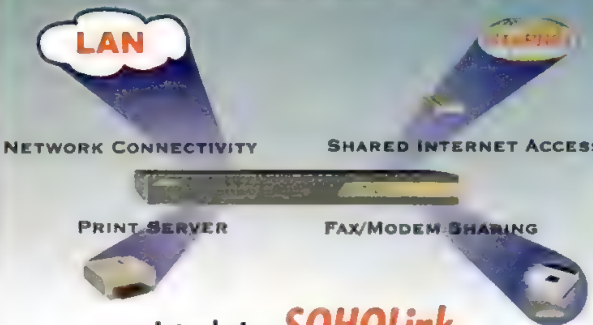
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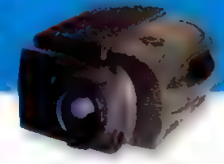
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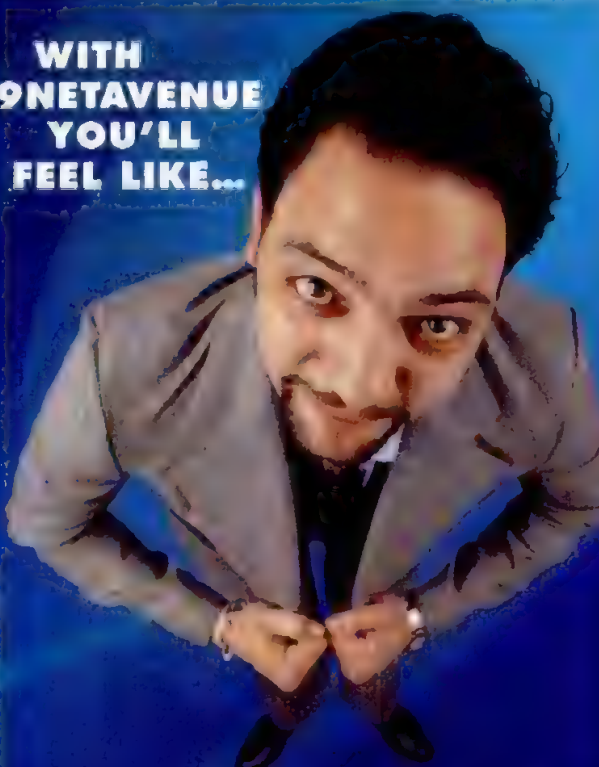
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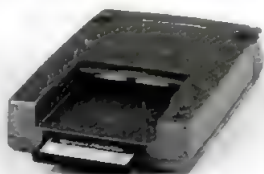
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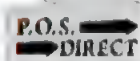
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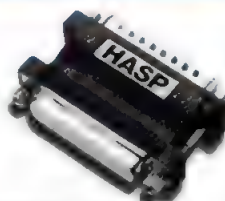


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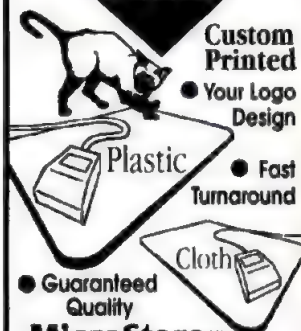
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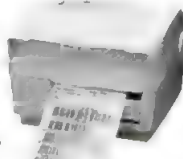
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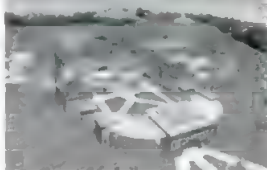
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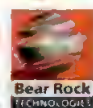
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Dynamix
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After Hours

Flying High

These five combat flight simulators let you take to the sky and do battle.

By Shane Mooney

There are hardly any more devoted (or should we say *rabid*) gaming fans than those dedicated to flight simulators. And there's great reason for them to be overjoyed, as this fall has brought a bumper crop of top-gun titles.

Although we reviewed five combat flight sims and previewed beta copies of two others (see the sidebar "On the Horizon"), it is worth noting a few upcoming releases that were not available in time to make our story but are sure to be big players when they debut. Microsoft Combat Flight Simulator combines all the components of the perennial best-seller Flight Simulator with the events of World War II. And Jane's Combat Simulations is offering Israeli Air Force, which re-creates the entire array of Israeli planes, and WWII Fighters, a simulation of World War II Europe.

F-15



When most people think of the defining criterion of a flight sim they think of realism. And when it comes to replicating real-world environments and scenarios on-screen, what

better company to turn to than the one that provides information to the U.S. military, Jane's Combat Simulations? The company's F-15 provides the total flight experience; you just need to add the mirrored shades. This is not a title for the casual flier.

There are two different modes of game play. There is a mode that lets you get up in the air quickly, but it will not keep the hard-core flier occupied for too long. To get the full



effect of F-15, you need to play the expert mode. Although the expert level is truly for those well versed in the ways of flight sims, for those willing to undertake the rigorous training, this is the complete package. The game requires you to learn and understand practically every component of flight.

The graphics in this game are outstanding, especially



when you're using a 3-D accelerator—so much so that the game puts others to shame. The fluid graphics show no sign of lagging frame rates, even during intense in-flight battles. This

game is also filled with sounds and voices from your wingmen and from the tower, which adds an extra element of realism.

Along with an excellent training mode, you get two campaigns, both involving Iraq. If you choose, you can also create your own sorties with the program's mission builder.

Flight sim fans are basically in a no-lose situation when it comes to selecting F-15. The only minor quibble we have is that in multiplayer mode, there are no cooperative missions; you can only go head to head.

F-22 Total Air War

Ho-hum, you may be thinking, another F-22 simulation. Wrong. The developers at Digital Image Design, not content with merely having the

most realistic F-22 sim, have decided to raise the bar with F-22 Total Air War. The sequel to F-22 Air Dominance Fighter, Total Air War tackles the task of creating a whole new genre of flight sim strategy game.

The game's 3Dfx engine definitely has the goods in the good-looks department, with everything from realistic crashes to true 3-D clouds. We've all seen great flight sims, but for Total Air War that's only the beginning; it's as much a strate-

INSIDE

LISTEN UP

The Sound Blaster Live! turns your PC into a home theater—with a little help from some good speakers. *Page 304.*



QUICK CLIPS

From golf playing to image editing, we take a quick look at six new titles. *Page 306.*

After Hours

gy war game as it is a flight sim.

You can choose to assume the role of a weapons officer, Airborne Warning and Control System (AWACS) commander, combat pilot, or tactical mission planner—jumping from role to role as the mission merits, if you so desire. As a weapons officer, you are responsible for adequately arming your team for battle. Take the role of AWACS commander and you must alert the allies to incoming enemies and extricate them from dangerous situations. Being behind the controls of your F-22 as a combat

pilot gives you a chance to engage the game's 22,000 targets. Finally, the advanced-mission-planner component of the program lets you employ the latest in stealth tactics, assembling and deploying strike packages from a wide variety of aircraft, as you sit back in the relative safety of your command outpost and watch your strategy unfold.

A dynamic, nonlinear, real-time campaign, ten open-ended scenarios leading to thousands of possible permutations, an excellent tutorial, and force-feedback support are just some of the features that make this one impressive F-22 combat sim. It's probably not going to get nearly the attention it deserves, however, especially once the Falcon 4.0 machine kicks into overdrive just before the holiday season.

iF/A-18E Carrier Strike Fighter

Time was when you could slap any old virtual cockpit onto a game and call it a flight sim. But today's enthusiasts want intensity and behav-

ior so realistic that they can smell the jet fuel. Naturally, when you're dealing with a company such as Interactive Magic, realism isn't a problem. But in the ever-crowded world of flight



sims, iF/A-18E Carrier Strike Fighter is going to have a tough time competing against its superior rivals.

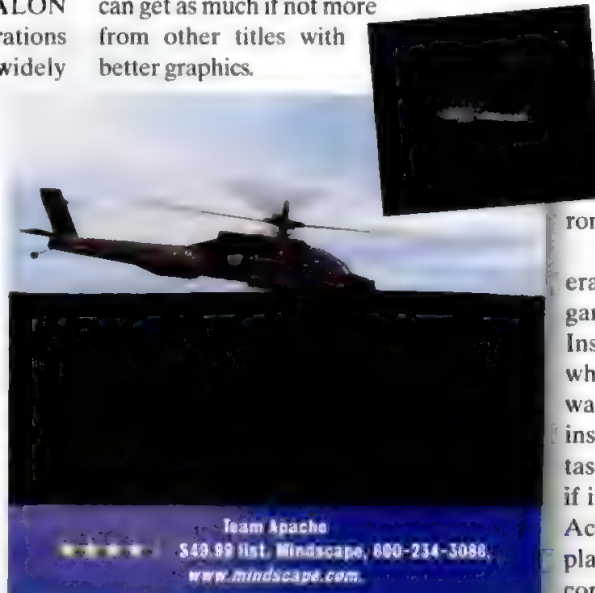
This title uses TALON (Total Air & Land Operations Network), the same widely regarded dynamic campaign generator as in the same manufacturer's iF-22 game. It is capable of creating an endless number of single missions and full-blown campaigns. There is also the Demon terrain system, which combines real-world elevation data with satellite imagery to produce hundreds of thousands of square miles of photo-realistic terrain with no repetition (or as little repetition as possible when flying over miles of desert near the Persian Gulf). These quality graphics, a great tutorial, and excellent audio help make iF/A-18E a solid simulation.

Now for the bad news. Although the game comes

with a host of video options, including 3-D acceleration and the ability to run at 1,024-by-

768 resolution, the arcade-like graphics were disappointing. Although the background scenes and the video clips were well rendered, the game play was straight out of the local video arcade. Compared with titles such as F-15 and Falcon 4.0, which have superior graphics during game play, iF/A-18E falls short.

Though this game has practically everything you could want in a serious flight sim—from instrumentation to realistic flight models—you can get as much if not more from other titles with better graphics.



Team Apache

There are two things people seem to forget about flight sims: They can be fun, and you don't always have to fly an airplane. Mindscape has covered both these points with Team Apache, where you fly a helicopter and have a lot of

fun doing it. Team Apache isn't a hard-core military sim in the Longbow 2 sense; it doesn't have a 30-hour training period, and it won't teach you everything you always wanted to know about the Apache attack helicopter. Team Apache will give you original game play, however, a thing that is almost unheard-of in military flight sims.

But how does Team Apache look? In a word, it's spectacular. The level of detail in this game is outstanding, and no matter where you look there are detailed graphics elements that bring the game world to life. The sound is a bit disappointing; you are bombarded with phony digitized voices and the annoying crackle and hiss of the radio. Beyond the disappointing voices, the sound effects are acceptable. And Team Apache has force-feedback capability, giving you the chance to immerse yourself completely in the game's environment.

There are several options in this game, including Instant Action, which in this case was a bit too instant for our taste. It seemed as if in every Instant Action mission we played, the helicopter was at least heavily damaged

and sometimes destroyed before we could even get off the ground.

You also have the Combat Mission option. The missions are broken down into two campaigns: You can take out drug lords in Colombia or battle the Russians in Latvia. The final

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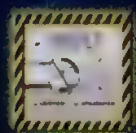
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After Hours

option is the training mode, which is extremely rigid.

The bottom line? Team Apache is more concerned with how enjoyable it is to play than how complex the instrumentation is to learn, and in that respect, this game's a blast.

WarBirds

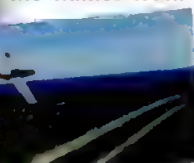
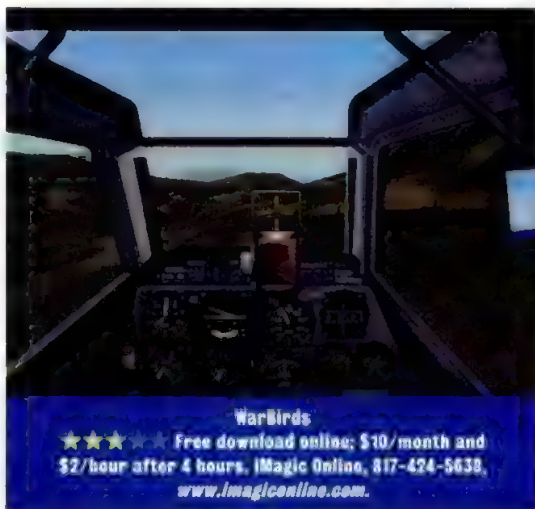
Wouldn't it be great to have a game where you could experience pure dog-fighting action with the difficulty of playing against real players? WarBirds, an online combat flight simulator, delivers just that.

The game can be played off-line or against hundreds of human opponents on iMagic Online, with several generic missions and practice missions. You can

also play WarBirds head-to-head via modem, and if you choose this option, you won't incur the monthly online charges. At \$10 per month and \$2 per hour after the first 4

continued support and some of the most experienced opponents who have ever played online.

As soon as you enter the WarBirds world, you will notice the superb 3-D graphics. The terrain flows by smoothly, and the flames from



machine-gun damage to the airplane are incredible; the midair explosions are also outstanding.

In addition, this game has force-feedback joysticks for that added realism that most of us crave in flight

games. Of course, the sounds of the game are authentic, from the sputter of the engine start-up to machine-gun fire to the distinct sound of an airplane plummeting toward the earth.

You have the opportunity to fly more than 50 World War II-era aircraft, each with its own unique flight characteristics and modeling (as well as training period). If you just want to concentrate on shooting other planes out of the sky, you can jump in the gunner's seat of a bomber and let someone else fly for a while. Keep in mind that this is an online game, so you'll have to deal with some of the frustrations of online play, such as lags and packet loss. But despite these minor frustrations, War-Birds is still one of the most realistic flight sims you'll ever encounter.

On the Horizon

This fall and winter will see a bumper crop of flight simulations debuting, and we previewed two of the offerings from MicroProse. Although what we saw was not the finished version, it was impressive nonetheless.

MicroProse (800-656-5443, www.microprose.com) is the developer of what is arguably the greatest flight sim ever—Falcon. The company is preparing a one-two punch for the final months of 1998, and it takes the form of European Air War and the highly anticipated Falcon 4.0.

Falcon 4.0 has been three years in the making, and it delivers the full flight package. As a pilot in an F-16 jet fighter, you're plunged into a full-blown war in the Korean peninsula. The superrealistic 3-D terrain and plane are both based on their actual counterparts. MicroProse is striving to reproduce everything that made the original so great, and then going one step farther by upgrading the sound and graphics. The flight models in Falcon 4.0 include state-of-the-art planes, as well as some aircraft that are still in development. The sim utilizes 3Dfx, of course, and the physics

and avionics are as dead-on as they can get.

With *European Air War*, the sequel to *1942: Pacific Air War*, the company promises that you'll get World War II dogfighting action based on historical events. There's even newsreel footage from the war. You'll have the opportunity to pilot 20 authentic planes of British, German, and American origin and do battle in either combat or campaign mode. Multiplayer games give you the added option of cooperative missions. Though the setting of *European Air*



War is WWII, that doesn't mean the graphics are from the same era; they're on the same level as Falcon's.

The impressive point about *European Air War* is the number of planes in the air at any given time (up to 256). You'll see action from all angles with no stutter in the graphics and impressive AI flight tactics from the enemy. You'll even experience the Doppler effect as you fly around other planes.

For flight sim fans there's no question; come Christmas, it's going to be a wonderful life.—Shane Mooney





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Music to Your Ears

Rock your world with positional sound from Creative Labs.

By Bruce Brown

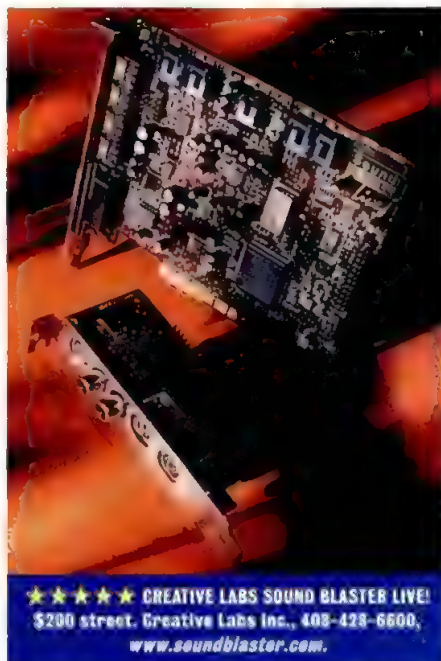
With the Creative Labs Sound Blaster Live! and a set of Cambridge SoundWorks PCWorks FourPoint-Surround speakers, you can set up your PC for great audio, an engaging home theater experience (with a DVD drive), and a thrilling game environment where you can hear the bad guys sneak up behind you.

The Sound Blaster Live! audio system, which uses Creative Labs' new positional-sound technology Environmental Audio, is the company's high-end audio hardware/software combination. The Sound Blaster Live! combines multi-channel positional sound with audio controls that let you define listening-environment characteristics for desired effects—whether it's sitting in the front row of an orchestra or walking through an echoing tunnel, waiting for ogres with blasters to take you down hard.

The Sound Blaster Live! has three components: Environmental Audio hardware; Environmental Audio software technologies, including modeling, multispeaker surround, environmental effects, SoundFonts, and positioning; and Environmental Audio Extensions—an API that lets software developers choose, use, and customize positional-audio effects and environments, building on Microsoft's DirectSound3D standard.

The Sound Blaster Live! half-length PCI audio card is

powered by an EMU10K1 32-bit 48-kHz audio engine and effects processor, with real-time sound effects and 8-point interpolation. An extra I/O card bracket is required to accom-



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modate the card's jacks, which include front and rear powered-speaker jacks, headphone and microphone jacks, separate pairs of in and out jacks for MIDI and SP/DIF, a multichannel digital-amplifier jack, and a joystick port.

Environmental Modeling positions objects and action correctly, using headphones or two to eight speakers. Simple setup tools help you specify your preferred environmental listening characteristics as well as specify the number and location of various speakers. Although a variety of speaker con-

figurations are supported, Creative recommends the Desktop Theater 5.1 and PCWorks FourPointSurround speaker systems, from Cambridge SoundWorks. To take full advantage of the Sound Blaster Live! experience, you need to plug speaker sets of equal power, sensitivity, and sound characteristics into the card's front and rear line-out jacks.

The riches continue in the application bundle. Creative Labs' own software titles include PlayCenter (a multimedia player), Launcher (a taskbar), AudioHQ (a control and configuration applet), Prody Parrot (a voice command and control utility), Rhythmania (an auto-accompanist), Keytar (a virtual-guitar console), and WaveStudio (a WAV file editor). Third-party titles include Mixman Technologies' Mixman Studio, Cakewalk Express Gold (a MIDI and four-track audio sequencer), Epic MegaGames' action game Unreal Special Edition 3D, and Sonic Foundry's Sound Forge XP 4.0. Installing the full software bundle is the most time-consuming part of setting up the package.

Demo and audio-control

software lets you try various sound effects and personalize your audio environment. If you turn off the 3-D effect, the relative flatness of sound is deadly. But with the effects on, music audio can have the echo of a concert hall, and games can quickly have you watching your back. The clarity is outstanding, and the power (even with the relatively inexpensive FourPointSurround speaker system) should be more than enough for users who value their eardrums.

Although Creative Labs' technology bundle can be used to enhance any audio source, to get the maximum effect you need to run software that uses Environmental Audio Extensions (EAX). These extensions to DirectSound3D let programmers choose from predefined sets of environmental effects—for example, those of an underwater environment, a stone corridor, a padded cell, or a cave. The primary extension properties include reverberation and audio reflection, which indicate spatial positioning.

Similar to Aureal's A3D Interactive (a positional technology with x-, y-, and z-coordinate control using just two speakers, which is the current leader in game title support), Creative Labs' EAX requires that developers code for the

standard. Introduced in 1997, A3D had a head start on EAX, but listings of current and announced games indicate that many major game houses (including Accolade and Activision) plan to support both standards. Gamers and multimedia enthusiasts only stand to benefit as the competing standards push the technology. **PC**



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After Hours

QUICK CLIPS

Amazon Trail 3rd Edition: Rainforest Adventures

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ClickArt Fine Art

Because of the cheap quality now associated with the term *clip art*, it's almost a shame to brand this program as such. More than 8,500 oil paintings, vintage postcards, watercolors, and photographs—in addition to 36 fonts and 4 artistic alphabets—make up the package. \$29.95 list; Broderbund Software, 800-521-6263.

Cydonia

Mars buffs will appreciate the time and attention paid to rendering the red planet in this adventure game: The graphics are wonderful. Fans of the adventure genre, however, might be put off by the game's slow pace. \$40 street; Dream-Catcher Interactive, 888-661-9999.

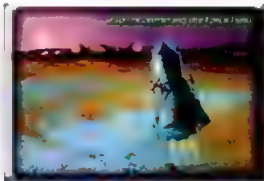
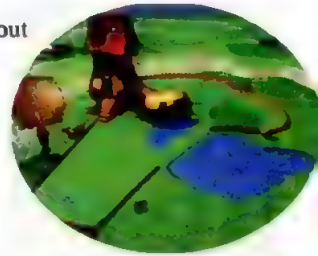


Photo Maxine

Not only does this image-editing software for girls create photo montages and stickers, but also girls can explore Cosmopolitan Virtual Makeover and Clueless, both of which are included in the package. \$49.95 list; Polaroid, 800-533-9680.

3D Ultra MiniGolf Deluxe

The premise is inviting: Break out your putter and attack the wildest miniature golf course you've ever seen. From an underwater hole to a haunted house, it's downright wacky. But we finished the 27 holes way too quickly. \$29.95 list; Sierra Attractions, 800-757-7707.



Titanic: Challenge of Discovery

If you're still enthralled by the *Titanic*, this combination adventure game/documentary is sure to please. Developed with Dr. Robert Ballard (the man who discovered the wreck), it's filled with real-life facts and photos. Your goal is to locate three sunken ships: the Titanic, the Bismark, and the Isis. \$49.95 list; Panasonic Interactive Media, 408-653-1888.

Coming Up

What's in the Next Issue of *PC Magazine*

PC Lines

We'll review more than 100 systems from more than 50 manufacturers, each tested with our latest benchmark test suites and scrutinized by the staff of PC Magazine Labs. Again this year, we'll divide these machines into two categories: professional/enthusiast PCs and managed PCs.

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IF IT DOESN'T MATTER WHO WINS THEN HOW COME THEY KEEP — SCORE? —



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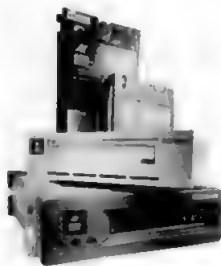
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Compaq ProLiant 6000 Compaq Computer Corp.....	227/	NovaWeb 2001 NovaWeb Technologies.....	232/908
Corex CardScan Executive Corex Technologies Corp.....	76/415	Online Merchant Alpha Software.....	76/400
Davis DLX650 Davis North America.....	45/418	PhotoSuite II MGI Software.....	73/407
Door-to-Door CoPilot TravRoute.....	52/401	Proxima UltraLight LS1 Proxima Corp.....	45/421
Earthmate Delorme.....	52/402	RedCreek Ravlin 10 RedCreek Communications Inc.....	216/903
Epson PowerLite 5500C Epson America Inc.....	45/419	Road Trips Door-to-Door 1999 TravRoute.....	51/401
IBM HomePage Creator for e-business IBM Corp.....	170/502	SecureMerchant 2.0 SunCommerce Corp.....	193/507
iCat Commerce Online iCat Corp.....	178/503	Shiva LanRover VPN Gateway Shiva Corp.....	218/904
In Focus LP425 In Focus.....	45/420	ShopBuilder 2.5 NetVentures Inc.....	195/508
Internet Creator E-Commerce Edition 4.05 Forman Interactive Corp.....	182/504	Smart and Friendly CD Rocket Smart and Friendly.....	60/413
Internet Devices Fort Knox Policy Router Internet Devices Inc.....	212/901	Sony CRX100E Spressa CD ReWritable Sony Electronics Inc.....	61/414
IT Director 1.1 Tivoli Systems Inc.....	227/906	Sony DDU220E/H 5X DVD-ROM Drive Sony Electronics Inc.....	60/412
L&H Voice Xpress Professional Lernout & Hauspie Speech Products USA Inc.....	64/410	Sony Digital Mavica MVC-FD81 Sony Electronics Inc.....	48/422
LapLink Professional 2.0 Traveling Software Inc.....	73/408	Street Atlas USA 6.0 Delorme.....	51/402
Map 'N Tracker Magellan Corp.....	52/417	StreetFinder Deluxe 1999 Edition Rand McNally.....	51/403
MerchandiZer 2.03 HipHip Software Inc.....	187/505	StreetPilot GPS Garmin International.....	52/416
Micron NetFrame 6200 Micron Electronics Inc.....	228/907	Street Wizard 6.0 Adept Computers Solution.....	52/404
Microsoft Cordless PC Phone System Microsoft Corp.....	68/411	TimeStep Permit Enterprise VPN Solution TimeStep Corp.	220/905
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ADVERTISERS' INDEX BY COMPANY

InfoLink No.	Advertiser	Page	InfoLink No.	Advertiser	Page	InfoLink No.	Advertiser	Page
*	3 Com Corporation	202	017	GCC Technologies	166-167	*	Pacific Bell	256A-256B
077	3Dfx Interactive	300-301	*	Hewlett Packard	32-33	*	Panasonic Communications & Systems Co.	72
096	Acer Peripherals	303	*	Hewlett Packard	195	209	Panda Software	231
218	Adaptec	251	*	Hewlett Packard	197	038	PC Connection	81-83
*	Advanced Micro Devices	176-177	140	Hitachi NSA	192	047	PC Connection	270-271
161	AIWA	308	*	Hughes Network Systems	69-71	330	PC Mall	264-265
162	American Power Conversion	50	*	IBM Corporation	112-113	080	PC Power & Cooling Systems	88
*	Anthro Corporation	94	*	IBM Corporation	149	032	Philips Electronics	317
*	AST Computers	59	084	iiyama North America	44	293	Play	299
*	Autodesk	162	184	iiyama North America	86	287	ProGen	98-99
355	Axis Communications	234A-234D	390	In Focus Systems	34	078	Promise Technology	199
010	Axis Systems	261	*	Intel Corporation	22-23	105	Proxim, Inc.	233
136	Bold Data	77	*	Intel Corporation	228-229	024	QMS	230
256	Check Point Software	223	166	Intelogis	211	290	Quantex	105-110
*	Compaq Computer Corporation	126-129	*	Intuit	118-119	337	RadioLAN	222
*	Compaq Computer Corporation	158-159	058	Ipswitch	204	065	Ramp Networks	219
*	Compaq Computer Corporation	171-174	106	Kingston Technology Corporation	20	*	REAL 3D	307
159	COMPUTER DISCOUNT WAREHOUSE	54-55	064	Lernout & Hauspie	152	309	S.A.G./Storage Solutions	16-17
360	COMPUTER DISCOUNT WAREHOUSE	56-57	094	Lexmark International Inc.	179	374	Seagate Software NSMG	221
158	COMPUTER DISCOUNT WAREHOUSE	272-273	194	Macromedia	131	206	Sierra Online	296
011	Corel Corporation	20	039	MAG InnoVision	18-19	284	Smart and Friendly	313
332	Corel Corporation	190	380	Matrox Graphics, Inc.	53	167	Smile Int'l.	243
203	Crucial Technology	132-133	299	McAfee Software	122-123	388	Sony Direct	66-67
059	Cyber Corporation	220	027	Micro Solutions Computer Products	260	*	SPSS, Inc.	254
333	D-Link Systems	208	003	Micro Warehouse	268-269	057	Statsoft	43
051	Data Comm Warehouse	224-225	070	Micrografx, Inc.	244	*	Symantec Corporation	183-186
*	Dell Computer Corporation	C5-C8	164	Micron Electronics	C2-C4,p1	001	Tektronix Inc.	62-63
*	Dell Computer Corporation	74-75	119	Micron Electronics	15	066	TigerDirect	318
*	Dell Computer Corporation	90-91	098	Micron Electronics	48A-49	377	Toshiba	26-27
*	Dell Computer Corporation	138-139	013	Micron Electronics	141-147	095	Transmond Technologies, Inc.	95
*	Dell Computer Corporation	188-189	*	Microsoft	12-13	088	Traveling Software	226
*	Dell Computer Corporation	263	*	Microsoft	121	028	U-Tron Technology	65
022	Delorme Mapping	201	*	Microsoft	154	025	Ulead Systems Inc.	92
*	Diamond Multimedia Systems	41	091	Microtek	239	242	Umax	25
*	DLTape Systems	5	089	Mindspring	206	243	Viagrafix	242
*	E*TRADE	8	254	Monorail	96	117	ViewSonic	84
232	ELSA, Inc.	309	154	NEC Computer Systems	2-3	085	Winbook	305
005	Epson America	78-79	156	NEC Computer Systems	180-181	273	Xircor	116
004	Epson America	134	155	NEC Technologies	125	006	Xirlink	311
090	Everex Systems	31	*	NetObjects	234	072	Yamaha Corp. of America	241
150	Fluke Corporation	210	*	Novell, Inc.	150-151	*	ZD Events	198
152	Fluke Corporation	215	118	Optiquist	115	*	ZD Events	258
099	Gateway	36A-37	*	Oracle Corp.	11	*	ZD-TV	247-249

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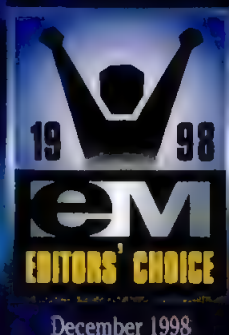
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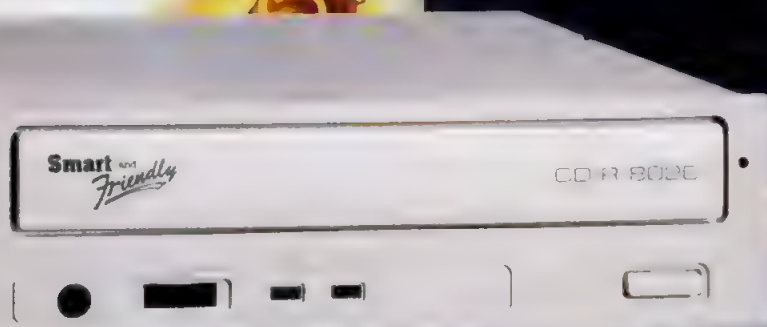
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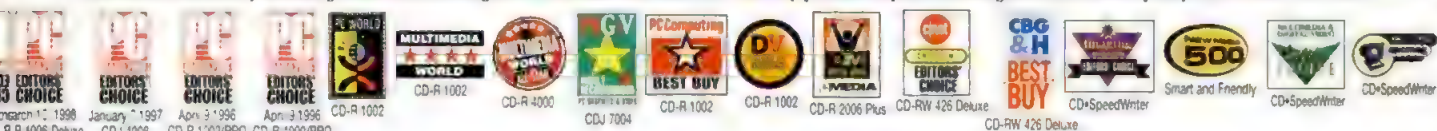
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Infolink No.	Company	Product	Page	Infolink No.	Company	Product	Page
ACCELERATOR BOARDS				FINANCIAL PLANNING SOFTWARE			
077	3Dfx Interactive	3D Graphics Chip Set	300-301	*	Intuit	Quicken	118-119
232	ELSA, Inc.	3D Graphics Accelerator Boards	309	GRAPHICS SOFTWARE			
380	Matrox Graphics, Inc.	Mystique 220 Series	53	332	Corel Corporation	Corel Draw 8	190
*	REAL 3D	3D Graphics Boards	307	HARD DRIVES			
ACCOUNTING SOFTWARE				*	DLTape Systems	DLT Tape Systems	5
*	Microsoft	Microsoft Money 99	121	HARDWARE			
ADD-ON BOARDS				077	3Dfx Interactive	3D Graphics Chip Set	300-301
077	3Dfx Interactive	3D Graphics Chip Set	300-301	096	Acer Peripherals	AcerView Monitors	303
380	Matrox Graphics, Inc.	Mystique 220 Series	53	218	Adaptec	Adaptec SCSI	251
ANTI-VIRUS SOFTWARE				161	AWA	AWA BOLT Drive	308
299	McAfee Software	McAfee Office	122-123	*	AST Computers	Notebooks, Desktops, Servers	59
209	Panda Software	Panda AntiVirus	231	333	D-Link Systems	Switches	208
*	Symantec Corporation	Small Business Solutions	183-186	*	Dell Computer Corporation	Notebooks, Dimension & Servers	C5-C8
BACKUP SOFTWARE				*	Dell Computer Corporation	Dimension	138-139
162	American Power Conversion	Back-UPS Line	50	*	Dell Computer Corporation	Servers	188-189
374	Seagate Software NSMG	Backup Executive	221	*	Dell Computer Corporation	Latitude, Dimension, Notebooks	263
CAD/CAM				*	Dell Computer Corporation	Dimension, Notebooks, Servers	74-75
*	Autodesk	AutoCAD LT	162	*	Dell Computer Corporation	Notebook Computers	90-91
CD-ROM				*	Diamond Multimedia Systems	Supra 56K PC Card Modem	41
284	Smart and Friendly	CD Rocket Bx CD Recorder	313	*	DLTape Systems	DLT Tape Systems	5
072	Yamaha Corp. of America	CD-R	241	232	ELSA, Inc.	3D Graphics Accelerator Boards	309
CHIPS/PROCESSORS				150	Fujitsu Corporation	One Touch Network Assistant	210
*	Advanced Micro Devices	K5 3D	176-177	099	Gateway	Notebooks, PCs, Mail Order, Peripherals	36A-37
*	Intel Corporation	Microprocessor	22-23	*	Hewlett Packard	HP LaserJet Printers	195
080	PC Power & Cooling Systems	Power Protection/Cooling Devices	88	*	Hewlett Packard	HP LaserJet Printers	197
COMMUNICATIONS SOFTWARE				084	Iiyama North America	Monitors	44
374	Seagate Software NSMG	Backup Executive	221	184	Iiyama North America	Monitors	86
*	Symantec Corporation	Small Business Solutions	183-186	*	Intel Corporation	Microprocessor	22-23
COMPUTERS/DESKTOPS				166	Intellogs	Plug-in Network	211
*	AST Computers	Desktop	59	039	MAG InnoVision	Monitors	18-19
010	Axis Systems	Desktop Computers	261	380	Matrox Graphics, Inc.	Mystique 220 Series	53
136	Bold Data	PCs	77	003	Micro Warehouse	Hardware, Software, Systems	268-269
*	Compaq Computer Corporation	Compaq DeskPro Series	126-129	254	Monorail	Desktop	96
*	Compaq Computer Corporation	Compaq Computer Corporation	158-159	156	NEC Computer Systems	Powermate Suite	180-181
*	Compaq Computer Corporation	Compaq Computer Corporation	171-174	154	NEC Computer Systems	Versa	2-3
158	COMPUTER DISCOUNT WAREHOUSE	Hardware	272-273	118	Optique	V35, V75 Monitors	115
159	COMPUTER DISCOUNT WAREHOUSE	Hardware	54-55	047	PC Connection	Mail Order	270-271
360	COMPUTER DISCOUNT WAREHOUSE	Hardware	56-57	038	PC Connection	Mail Order	81-83
*	Dell Computer Corporation	Notebooks, Dimension & Servers	C5-C8	330	PC Mail	Hardware, Software, Peripherals	264-265
*	Dell Computer Corporation	Dimension	138-139	080	PC Power & Cooling Systems	Power Protection/Cooling Devices	88
*	Dell Computer Corporation	Latitude, Dimension, Notebooks	263	032	Philips Electronics	Philips SpeechMik	317
*	Dell Computer Corporation	Dimension, Notebooks, Servers	74-75	287	ProGen	Desktops and Notebooks	98-99
099	Gateway	Notebooks, PCs, Mail Order, Peripherals	36A-37	078	Promise Technology	Drive Defender	199
*	Hewlett Packard	HP Commercial PC	32-33	337	RadioLAN	Wireless Networking	222
*	IBM Corporation	Commercial Desktop	149	065	Ramp Networks	WebRamp Router	219
003	Micro Warehouse	Hardware, Software, Systems	268-269	*	REAL 3D	3D Graphics Boards	307
164	Micron Electronics	Micron Family of Products	C2-C4 p1	309	S.A.G./Storage Solutions	Servers and Storage	16-17
013	Micron Electronics	Micron Family of Products	141-147	284	Smart and Friendly	CD Rocket Bx CD Recorder	313
119	Micron Electronics	Micron Mi lensa	15	380	Sony Direct	Notebooks & Digital Mavica Camera	56-57
096	Micron Electronics	Micron Family of Products	48A-49	001	Tektronix Inc.	Tektronix Family of Products	52-53
254	Monorail	Desktop	96	068	TigerDirect	TigerDirect	318
156	NEC Computer Systems	Powermate Suite	180-181	377	Toshiba	Notebooks	26-27
038	PC Connection	Mail Order	82-83	095	Transmond Technologies, Inc.	Notebook Computers	95
330	PC Mail	Hardware, Software, Peripherals	264-265	028	U-Tron Technology	Network Solutions	85
287	ProGen	Desktops and Notebooks	98-99	117	ViewSonic	Brilliant P817 Monitors	84
290	Quantex	Quantex Systems	105-110	273	Xircom	RealPort Integrated PC Card	116
309	S.A.G./Storage Solutions	Servers and Storage	16-17	006	Xirlink	C-i Video Conferencing Camera	311
068	TigerDirect	TigerDirect	318	072	Yamaha Corp. of America	CD-R	241
DATA BASE MANAGERS				HUBS			
*	Oracle Corp.	Oracle Designer	11	333	D-Link Systems	Switches	208
DIGITAL CAMERAS				*	Intel Corporation	Intel InBusiness	228-229
355	Axis Communications	ThinServer Technology	234A-234D	IMAGE EDITING SOFTWARE			
388	Sony Direct	Notebooks & Digital Mavica Camera	56-57	332	Corel Corporation	Corel Draw 8	190
DISK/TAPE DRIVES				025	Ulead Systems Inc.	Photo Impact 4.2	92
*	DLTape Systems	DLT Tape Systems	5	INTERNET			
027	Micro Solutions Computer Products	Backpack CD-Rewriter	260	*	E*TRADE	Online Investing	8
284	Smart and Friendly	CD Rocket Bx CD Recorder	313	*	Hughes Network Systems	DirectPC	69-71
E-MAIL SOFTWARE				058	Ipewich	Network Monitor Tool/Mail Server	204
089	Mindspring	Internet Access	206	*	Microsoft	Microsoft Network Internet Access	154
ENTERTAINMENT SOFTWARE				089	Mindspring	Internet Access	206
206	Sierra Online	Pro Pilot	296	*	NetObjects	Fusion 3.0	234
FAX SOFTWARE				*	Pacific Bell	SBC Communications	256A-256B
*	3 Com Corporation	PC Card	202	065	Ramp Networks	WebRamp Router	219
FAX/MODEM				LOCAL AREA NETWORKING			
*	3 Com Corporation	PC Card	203	158	COMPUTER DISCOUNT WAREHOUSE	Networking Products	272-273
MAIL ORDER				159	COMPUTER DISCOUNT WAREHOUSE	Networking Products	54-55
158	COMPUTER DISCOUNT WAREHOUSE	Reseller	272-273	360	COMPUTER DISCOUNT WAREHOUSE	Networking Products	56-57
159	COMPUTER DISCOUNT WAREHOUSE	Reseller	54-55	051	Data Comm Warehouse	Networking Products	224-225

Infolink No.	Company	Product	Page
360	COMPUTER DISCOUNT WAREHOUSE	Reseller	56-57
099	Gateway	Notebooks, PCs, Mail Order, Peripherals	36A-37
330	PC Mall	Hardware, Software, Peripherals	264-265
066	TigerDirect	TigerDirect	318
MAPPING SOFTWARE			
022	Delorme Mapping	Earthmate GPS	201
MASS STORAGE			
161	AWA	AWA BOLT Drive	308
027	Micro Solutions Computer Products	Backpack CD Rewriter	260
078	Promisa Technology	Drive Defender	199
309	S.A.G./Storage Solutions	Servers and Storage	16-17
284	Smart and Friendly	CD Rocket 8x CD Recorder	313
072	Yamaha Corp. of America	CD-R	241
MEMORY			
203	Crucial Technology	Memory Upgrades	132-133
106	Kingston Technology Corporation	Memory	20
MISCELLANEOUS			
•	Anthro Corporation	Technology Furniture	94
•	Panasonic Communications & Systems Co.	Giga Range Cordless Phone	72
•	ZD-TV	ZDTV	247-249
MODEMS			
•	3 Com Corporation	PC Card	202
•	Diamond Multimedia Systems	Supra 56K PC Card Modem	41
MONITORS			
096	Acer Peripherals	AcerView Monitors	303
140	Hitachi NSA	SuperScan Monitors	192
084	Iiyama North America	Monitors	44
184	Iiyama North America	Monitors	86
039	MAG ImmoVision	Monitors	18-19
155	NEC Technologies	Monitors	125
118	Optquest	V35, V75 Monitors	115
330	PC Mall	Hardware, Software, Peripherals	264-265
167	Smile Int'l	Monitors	243
117	ViewSonic	Brilliant PB17 Monitors	84
MOTHERBOARDS			
080	PC Power & Cooling Systems	Power Protection/Cooling Devices	88
MOUSE/MOUSE PADS			
032	Philips Electronics	Philips SpeechMike	317
MULTIMEDIA HARDWARE			
099	Gateway	Notebooks, PCs, Mail Order, Peripherals	36A-37
027	Micro Solutions Computer Products	Backpack CD-Rewriter	260
MULTIMEDIA SOFTWARE			
022	Delorme Mapping	Earthmate GPS	201
NETWORK INTERFACE CARDS			
273	Xircom	RealPort Integrated PC Card	116
NETWORK SYSTEMS/EQUIPMENT			
355	Axis Communications	ThinServer Technology	234A-234D
051	Data Comm Warehouse	Networking Products	224-225
150	Fluke Corporation	One Touch Network Assistant	210
166	Intelogis	Plug-in Network	211
105	Proxim, Inc.	Proxim Symphony	233
337	RadiolAN	Wireless Networking	222
065	Ramp Networks	WebRamp Router	219
NETWORKING SOFTWARE			
256	Check Point Software	VPN-1 Software	223
152	Fluke Corporation	Network Inspector	215
•	Hughes Network Systems	DiracPC	69-71
070	Micrografx, Inc.	NetworkCharter Pro	244
•	Novell, Inc.	Netware 5.0	150-151
NOTEBOOKS/LAPTOPS/PORTABLE PCS			
•	AST Computers	Notebook Computers	59
•	Compaq Computer Corporation	Compaq Computer Corporation	171-174
158	COMPUTER DISCOUNT WAREHOUSE	Laptops	272-273
159	COMPUTER DISCOUNT WAREHOUSE	Laptops	54-55
360	COMPUTER DISCOUNT WAREHOUSE	Laptops	56-57
•	Dell Computer Corporation	Notebooks, Dimension & Servers	C5-C8
•	Dell Computer Corporation	Latitude, Dimension, Notebooks	263
•	Dell Computer Corporation	Dimension, Notebooks, Servers	74-75
•	Dell Computer Corporation	Notebook Computers	90-91
099	Gateway	Notebooks, PCs, Mail Order, Peripherals	36A-37
164	Micron Electronics	Micron Family of Products	C2-C4.p1
013	Micron Electronics	Micron Family of Products	141-147
098	Micron Electronics	Micron Family of Products	48A-49
154	NEC Computer Systems	Versa	2-3
330	PC Mall	Hardware, Software, Peripherals	264-265
287	ProGen	Desktops and Notebooks	98-99
290	Quantex	Quantex Systems	105-110
388	Sony Direct	Notebooks & Digital Movie Camera	66-67
377	Toshiba	Notebooks	26-27

Infolink No.	Company	Product	Page
095	Transmod Technologies, Inc.	Notebook Computers	95
242	Umax	Umax ActonBook 536T/736T	25
085	Winbook	Winbook 233 MHz TitaniBook	305
ON LINE SERVICES			
•	E*TRADE	Online Investing	8
OPERATING SYSTEMS			
•	Microsoft	Microsoft Windows CE	12-13
•	Novell, Inc.	Netware 5.0	150-151
PC DIRECT			
010	Axis Systems	Desktop Computers	261
158	COMPUTER DISCOUNT WAREHOUSE	Reseller	272-273
027	Micro Solutions Computer Products	Backpack CD-Rewriter	260
003	Micro Warehouse	Hardware, Software, Systems	268-269
330	PC Mall	Hardware, Software, Peripherals	264-265
PCMCIA			
•	3 Com Corporation	PC Card	202
•	Diamond Multimedia Systems	Supra 56K PC Card Modem	41
PERIPHERALS			
355	Axis Communications	ThinServer Technology	234A-234D
•	Hewlett Packard	HP LaserJet Printers	195
•	Hewlett Packard	HP LaserJet Printers	197
•	Intel Corporation	Intel IndBusiness	228-229
380	Matrox Graphics, Inc.	Mystique 220 Series	53
047	PC Connection	Mail Order	270-271
•	PC Connection	Mail Order	81
330	PC Mall	Hardware, Software, Peripherals	264-265
284	Smart and Friendly	CD Rocket 8x CD Recorder	313
273	Xircom	RealPort Integrated PC Card	116
POWER PROTECTION			
162	American Power Conversion	Back-UPS Line	50
PRINTER ACCESSORIES			
017	GCC Technologies	Elite Line of Printers	166-167
PRINTERS			
005	Epson America	EPSON Stylus Color Printers	78-79
017	GCC Technologies	Elite Line of Printers	166-167
•	Hewlett Packard	HP LaserJet Printers	195
•	Hewlett Packard	HP LaserJet Printers	197
094	Lexmark International Inc.	Lexmark Printers	179
330	PC Mall	Hardware, Software, Peripherals	264-265
024	QMS	Printers	230
001	Tektronix Inc.	Tektronix Family of Products	62-63
PROGRAM DEVELOPERS			
•	Oracle Corp.	Oracle Designer	11
PROGRAMMERS TOOLS UTILITIES			
•	Oracle Corp.	Oracle Designer	11
PROJECTORS/PANALS			
004	Epson America	LCD Projectors	134
390	In Focus Systems	DLP Projector	34
REMOTE ACCESS SOFTWARE			
•	Novell, Inc.	Netware 5.0	150-151
088	Traveling Software	Laplink for Windows	226
REMOTE COMPUTING			
•	3 Com Corporation	PC Card	202
058	IpSwitch	Network Monitor Tool/Mail Server	204
RESELLERS			
159	COMPUTER DISCOUNT WAREHOUSE	Reseller	54-55
360	COMPUTER DISCOUNT WAREHOUSE	Reseller	56-57
SCANNERS			
091	Microtek	ScanMaker XBEL	239
SECURITY SOFTWARE			
299	McAfee Software	McAfee Office	122-123
SERVERS			
•	AST Computers	Servers	59
•	Compaq Computer Corporation	Compaq Computer Corporation	171-174
•	Dell Computer Corporation	Notebooks, Dimension & Servers	C5-C8
•	Dell Computer Corporation	Servers	188-189
•	Dell Computer Corporation	Latitude, Dimension, Notebooks	263
•	Dell Computer Corporation	Dimension, Notebooks, Servers	74-75
090	Everex Systems	Servers	31
•	IBM Corporation	Netfinity	112-113
•	Intel Corporation	Microprocessor	22-23
290	Quantex	Quantex Systems	105-110
309	S.A.G./Storage Solutions	Servers and Storage	16-17
028	U-Tron Technology	Network Solutions	85

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ADVERTISERS' INDEX

Infolink No.	Company	Product	Page
SOFTWARE			
*	Autodesk	AutoCAD LT	182
332	Corel Corporation	Corel Draw 8	180
011	Corel Corporation	Corel WordPerfect Suite	20
152	Fluke Corporation	Network Inspector	215
*	Imbit	Quicken	118-119
194	Macromedia	FreeHand 8	131
298	McAfee Software	McAfee Office	122-123
003	Micro Warehouse	Hardware, Software, Systems	268-269
670	Micrograph, Inc.	NetworkCharter Pro	244
*	Microsoft	Microsoft Windows CE	12-13
*	NetObjects	Fusion 3.0	234
*	Oracle Corp.	Oracle Designer	11
288	Panda Software	Panda AntiVirus	221
047	PC Connection	Mail Order	270-271
038	PC Connection	Mail Order	81-83
330	PC Mail	Hardware, Software, Peripherals	264-265
293	Play	Game 98	299
*	SPSS, Inc.	SPSS 8.0 for Windows	254
243	Viagrafix	Window NT 4 MCSE	242
SPREADSHEET/TEMPLATES			
011	Corel Corporation	Corel WordPerfect Suite	20
STATISTICAL SOFTWARE			
*	SPSS, Inc.	SPSS 8.0 for Windows	254
057	Statsoft	Statistical Software	43
SWITCHES			
009	Cybus Corporation	SwitchView	220
333	D-Link Systems	Switches	208
TAX SOFTWARE			
*	Imbit	Quicken	118-119
TELECOMMUNICATIONS			
*	Pacific Bell	SBC Communications	256A-256B
TRAINING SOFTWARE			
243	Viagrafix	Window NT 4 MCSE	242
TRAINING/SEMINARS/CONFERENCES			
*	ZD Events	Java Internet Business Expo	258
UTILITIES			
298	McAfee Software	McAfee Office	122-123
293	Play	Game 98	299
*	Symantec Corporation	Small Business Solutions	183-186
VIDEO CONFERENCING			
006	Xirlink	C-it Video Conferencing Camera	311
VIDEO/GRAPHIC BOARDS			
077	3Dfx Interactive	3D Graphics Chip Set	300-301
232	ELSA, Inc.	3D Graphics Accelerator Boards	308
380	Motrox Graphics, Inc.	Mystique 220 Series	53
*	REAL 3D	3D Graphics Boards	307
VOICE RECOGNITION SOFTWARE			
011	Corel Corporation	Corel WordPerfect Suite	20
064	Lemout & Hauspie	Voice Xpress Products	152
WEB SITE DEVELOPMENT SOFTWARE			
*	NetObjects	Fusion 3.0	234
025	Ulead Systems Inc.	Photo Impact 4.2	92
WEB SOFTWARE			
256	Check Point Software	VPN-1 Software	223
194	Macromedia	FreeHand 8	131
*	NetObjects	Fusion 3.0	234
WEB/INTERNET SERVICES			
355	Asa Communications	ThinServer Technology	234A-234D
099	Mindspring	Internet Access	206
*	Pacific Bell	SBC Communications	256A-256B
WINDOWS SOFTWARE			
058	Ipswitch	Network Monitor Tool/Mail Server	204
293	Play	Game 98	299
*	SPSS, Inc.	SPSS 8.0 for Windows	254
*	Symantec Corporation	Small Business Solutions	183-186
WIRELESS NETWORK EQUIPMENT			
105	Proxim, Inc.	Proxim Symphony	233
337	RadioLAN	Wireless Networking	222
WORD PROCESSING SOFTWARE			
011	Corel Corporation	Corel WordPerfect Suite	20
WORKSTATIONS			
158	NEC Computer Systems	Powermate Suite	180-181
028	U-Turn Technology	Network Solutions	85

For Additional Categories see MARKETPLACE PRODUCT INDEX PAGE 274.

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The K6-2 beats the Pentium II in price and performance, taking personal computing to a new level of performance and realism. With its new, innovative 3DNow!™ technology, the AMD-K6-2 processor offers better overall performance and a superior 3D experience for Windows computing. The world's first x86 processor with 3D enhancement technology, the AMD-K6-2 delivers sharper and more lifelike 3D imaging, big screen sound and video, and the ultimate Internet experience. The bottom line: the AMD-K6-2 provides the best overall performance! The AMD-K6-2 processor works hand-in-hand with today's leading 3D graphics accelerators to maximize 3D processing power for the utmost realism in personal computing. It's amazing 3D graphics, video, audio and telephony capabilities are unsurpassed. At Tiger Labs, the video and 3D graphics scores were the best we have ever seen. We could not believe it, the AMD-K6-2 beat the Pentium II. To top it off, we've put together an awesome combination of exactly the right hardware to make these systems fly with more power-packed performance than ever before. But the most surprising thing is the low price! Tiger's complete K6-2/333 with 3DNow!™ multimedia systems feature everything you could possibly want in a business system or super gaming system—a whopping 96 MBs of high speed PC100 SDRAM memory, quality 56K Internet-ready faxmodem with speakerphone and voice, huge 8.4GB Ultra DMA/33 hard drive, STB Velocity128-bit 8MB AGP photorealistic full-color video with 3D processing, a thundering 3D wave table sound system and much more.

TIGER K-SERIES QUALITY COMPONENTS



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onboard, Ultra DMA hard drives are twice as fast as the old EIDE standard, and the motherboard bus speed runs up to 100MHz—it has a 35% boost in performance over 66MHz bus systems. A faster bus speed makes your memory, expansion slots, CPU and more go faster. But, as we mentioned earlier, the biggest difference is in the AGP slot, the new bus speeds push AGP's 528MB/sec. x2 mode to its limits. Only the AMD-K6-2 combines advanced six-issue RISC86 instruction decoders, large on-chip L1 cache, 3DNow!™ technology and AGP graphics to give you leading-edge sixth generation performance!

Better 3D than the Pentium II! The AMD-K6-2 3DNow!™ processor delivers the most powerful solution for 3D multimedia experience compared to the Pentium II processor. It utilizes AMD's instruction set, Microsoft DirectX 6, OpenGL API

The All-New AMD-K6-2 With 3DNow! Technology

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John C. Dvorak, PC Magazine



libraries, and leading game developers to provide the ultimate gaming experience. The K6-2 processor will accelerate and enhance 3D graphics with full-featured MPEG-2 video and AC-3 (Dolby Digital™) sound.

Costs Less Than The Pentium II! The AMD-K6 costs less than Intel's Pentium II right from the start, but there's more to a complete multimedia system than just the processor. That's why AMD built the K6 to fit on a motherboard with a standard Socket 7 processor base... the same type of motherboard used for the Pentium MMX and IBM 686MX processor. In other words, these motherboards are built in high volume with competitively lower prices and more popular features. The Intel Pentium II, on the other hand, use their own unique processor socket. So there are fewer built with inherently higher prices. And with competition you get technical advances born out of necessity—like Tiger's high-performance DIMM memory slots. DIMM slots have twice the throughput (64 bits) of SIMMs, giving an overall performance boost. You also get the new VIA MVP 3 chipset—the fastest available in the world today.

The Industry's Most Feature-Packed Motherboards! While the AMD-K6 MMX processor is pulsating with ready-to-run power, the motherboards that we've selected for these state-of-the-art systems add their own dimension of advanced technology. Tiger's technically superior motherboards feature both DIMM and SIMM memory slots, so you can run whatever type of memory suits your needs—from error-correcting ECC RAM (the best for servers), to the fastest SDRAM (the best for power-users). These motherboards also support Ultra DMA/33 hard drives—bursting hard disk transfers up to 33MB/sec! New Ultra DMA/33 mode is twice as fast as the previous best. You also get wave table sound and support of Microsoft's PC'97 specs. The AMD-K6-300 MHz with MMX technology comes with Tiger's marvelous AT motherboard with 512KB of cache, 4 PCI, 3 ISA and much more. We've included a huge 4.3GB Ultra DMA/33 hard drive. Ultra DMA hard drive are twice as fast as the old EIDE 16MB/sec transfer rate. With the 24X CD-ROM, you'll never have to wait for a game to load or skip a frame on your favorite CD-ROM movie.



3D WinBench98

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Abort, Retry, Fail?

A demonstration of the importance of good spelling (Global InfoNet).

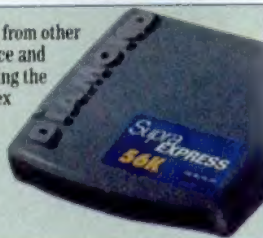
Well, if you're going to be inoperable, you may as well do it to the best of your ability. (Tiger Direct catalog.)

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The Case of the Missing Internet

As Microsoft battles the Department of Justice, CEO Bill Gates is asserting that Microsoft executives had started to plan their overall Internet strategy as early as mid-1994. It's strange to note then, as faithful reader Bennett Ruda did, that the 1995 version of Encarta—Microsoft's CD-ROM-based encyclopedia—has no listing for *Internet*.

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